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NEW CONSIDERATIONS IN AN OLD GENUS: *DATURA*

BY

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THE genus *Datura* has received considerable attention over the years from ethnobotanists and pharmacologists whose interest in this group of plants stems from the presence of the toxic alkaloids contained in most, if not all, of the species. The herbaceous members of the genus have assumed an outstanding position in the annals of experimental botany at the hands of geneticists and cytologists. In spite of the amount of space devoted to this genus in the literature, we are still in need of an adequate taxonomic treatment. It is hoped that this paper will help to clarify some of the nomenclatorial intricacies surrounding two species well known to botanists and workers in allied fields. Furthermore, descriptions of three new species which were discovered during the preparation of a monograph of the genus are included.

There has been much controversy concerning the correct name for the species which has been known as *Datura meteloides* DC. ex Dunal, but which preferably should be called *D. inoxia* Miller. In order to understand how this confusion came about it is necessary to present a brief résumé of the nomenclatorial history of these concepts.

I. THE TYPIFICATION OF *Datura meteloides* DC. ex Dunal

The name *Datura meteloides* was first proposed by Dunal in a manuscript which he sent to Alphonse de Candolle, who in turn published the epithet in his Prodromus (1852). Hence, the correct citation should be *Datura meteloides* DC. ex Dunal. Alphonse de Candolle based his concept of *D. meteloides* on both the drawing and the description by Sessé and Mociño as we may see from the following note in the Prodromus: "In calidis Novae Hispaniae regionibus. D. Metel Moc. et Sess. pl. Mexic. ined. ic. et mss. t. 919, collect. transl. Candoll." The original Sessé and Mociño illustrations were loaned to August Pyramus de Candolle and were recalled on short notice. As a result, de Candolle, who recognized the value of these drawings, enlisted the help of the townspeople of Geneva to make copies of them before sending them back. One of these copies, Icones no. 919, has served as the type of *D. meteloides* and is now preserved in the Candollean Herbarium (Ewan, 1944).

In 1855, a new *Datura* was brought into cultivation by the French horticulturist M. Louis Vilmorin from seeds sent him by Asa Gray who had obtained them from a collection made by Charles Wright (no. 526) in western Texas in 1849. This plant was cultivated and distributed under the name of *Datura meteloides* (Ewan, 1944). M. Ortgies, an employee of the Vilmorin Co. of France, noticed the discrepancy between de Candolle's description of *D. meteloides* and the plant cultivated under the same name and brought it to the attention of the German botanist, Dr. Eduard von Regel. As a result, a new species, *D. Wrightii*, was published by Regel (1859).

Gray (1878) considered the southwestern perennial species of the United States to represent *Datura mete-*

loides and relegated *D. Wrightii* to synonymy handling the obvious lack of agreement between the two descriptions with the following comment: ". . . Dunal in DC. Prodr. l.c. 544 (the descr. and drawing of Mocino and Sesse wrong as to 10-dentate corolla)." This erroneous interpretation was adopted by Safford (1921) who apparently followed Gray.

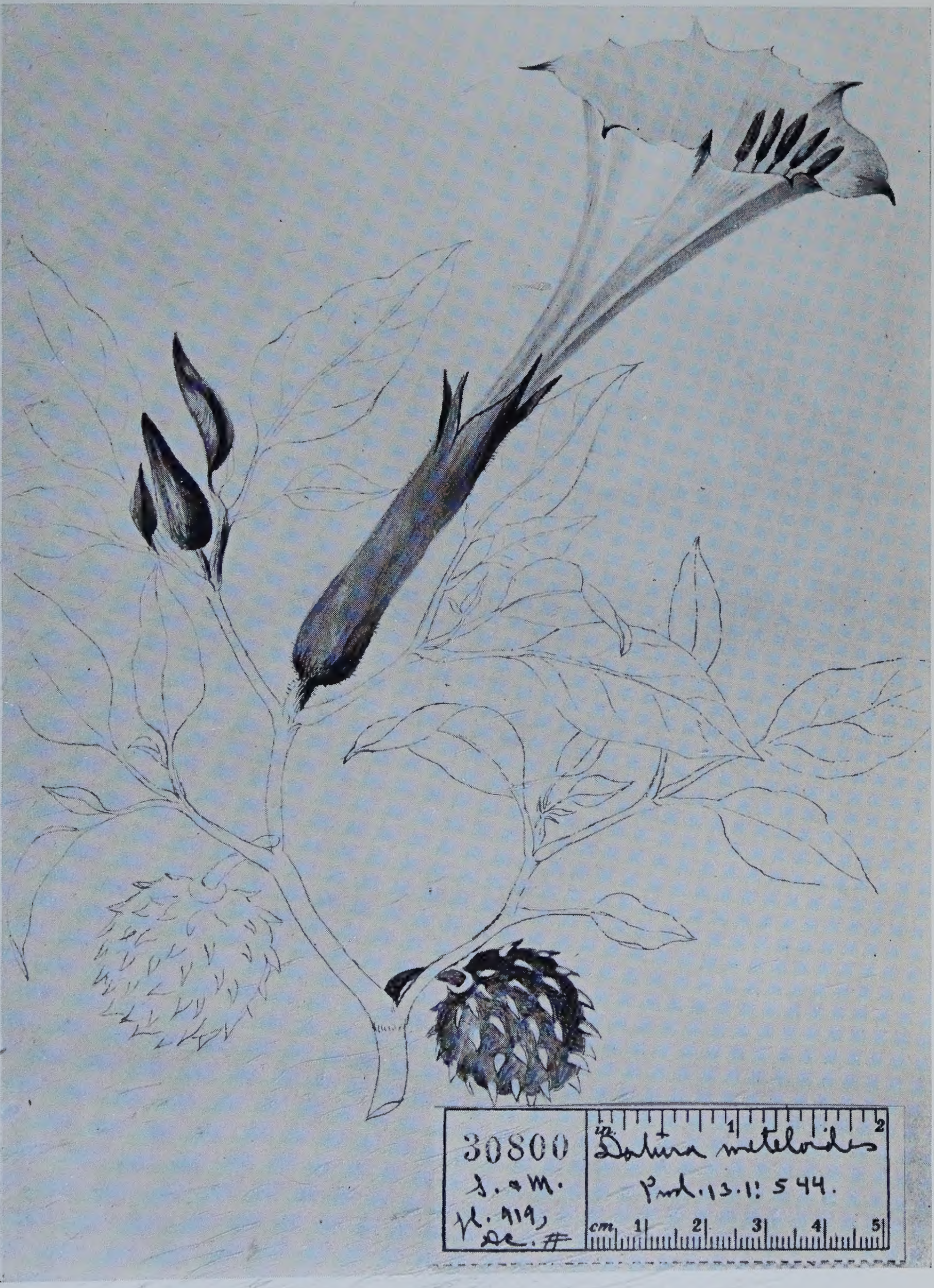
It is obvious from Dunal's monograph (1852) that he had no knowledge of *Datura inoxia* Mill. (Miller, 1786) which, since it is apparently identical with *D. meteloides,* enjoys priority. Miss Helen Timmerman (1927), although recognizing the problem existing in the literature, failed to reach a satisfactory conclusion regarding *D. meteloides* and *D. inoxia* probably due to insufficient material at hand.

Recently, Ewan (1944) became cognizant of the problem concerning the discrepancy between the description of *Datura meteloides* sensu DC. and our perennial southwestern species commonly known by that name. In attempting to unravel this confusion he presented an excellent account of the historical backgrounds of both *D. meteloides* and *D. Wrightii.* His conclusion that de Candolle's *D. meteloides* "cannot be shown to be a misapplied binomial because no other species of *Datura* has been found in central Mexico which agrees with the original description nor the drawing upon which it is based" is hardly acceptable due to the ample herbarium material of *D. inoxia* at hand. Furthermore, his recommendation that the name to be applied to our perennial species should be *D. Wrightii,* provided the identity of *D. meteloides* DC. ex Dunal cannot be ascertained, requires more thought. His proposal that the collection *C. Wright no. 526* (US 60042) be designated as lectotype of *D. Wrightii* with Turkey Creek, Uvalde-Kinney Co. line, Texas as type locality appears to be a wise choice, but,

EXPLANATION OF THE ILLUSTRATION

PLATE L. The illustration of DATURA METELOIDES *DC. ex Dunal* in the Candollean Herbarium which formerly served as type.

PLATE L

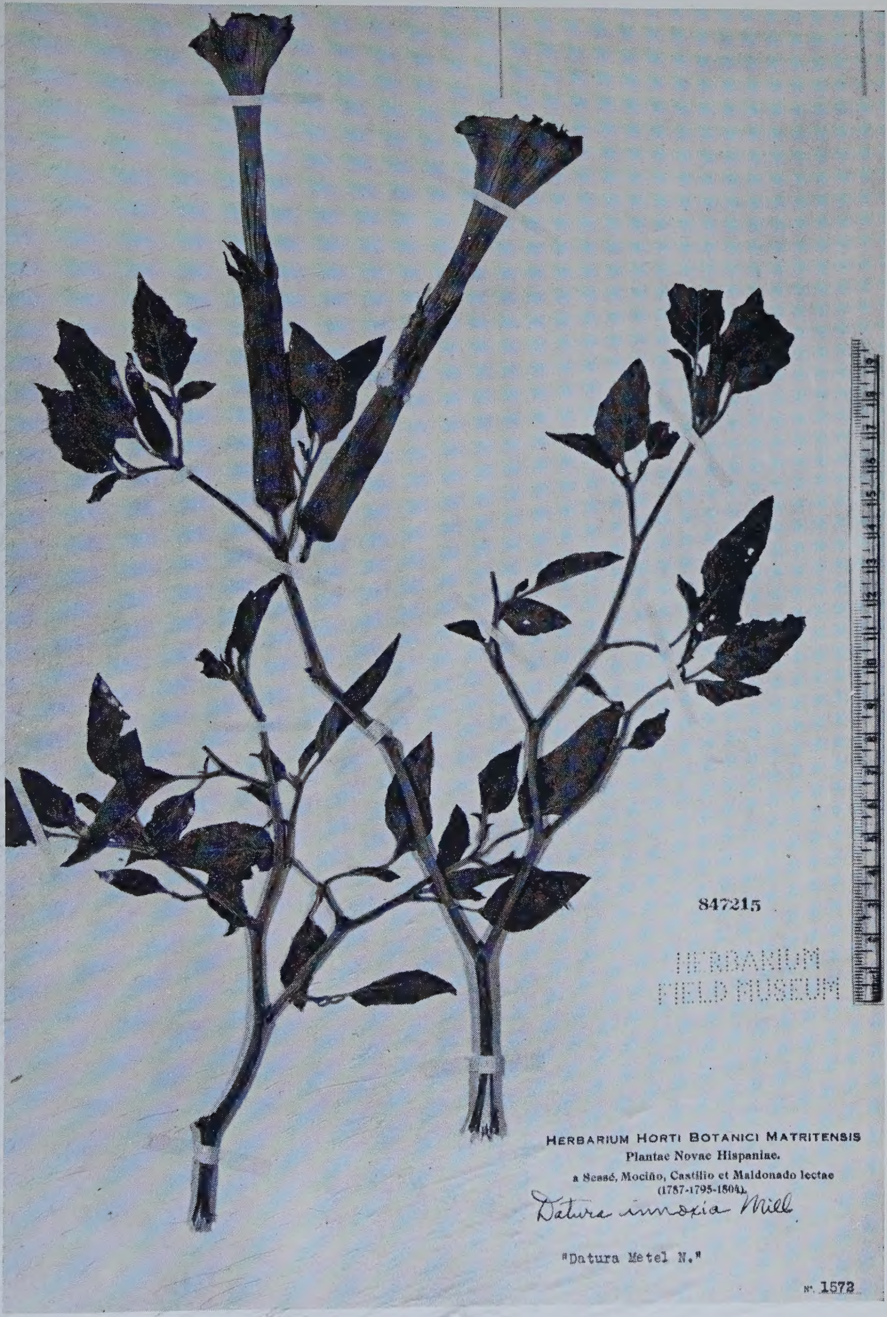

30800
S. & M.
pl. 919,
Dc. #
in. 1 2
Datura meteloides
Prod. 13.1: 544.
cm 1 2 3 4 5

EXPLANATION OF THE ILLUSTRATION

Plate LI. Isotype of Datura meteloides preserved in the Chicago Natural History Museum.

Photograph by A. S. Barclay and R. T. Moore

PLATE LI

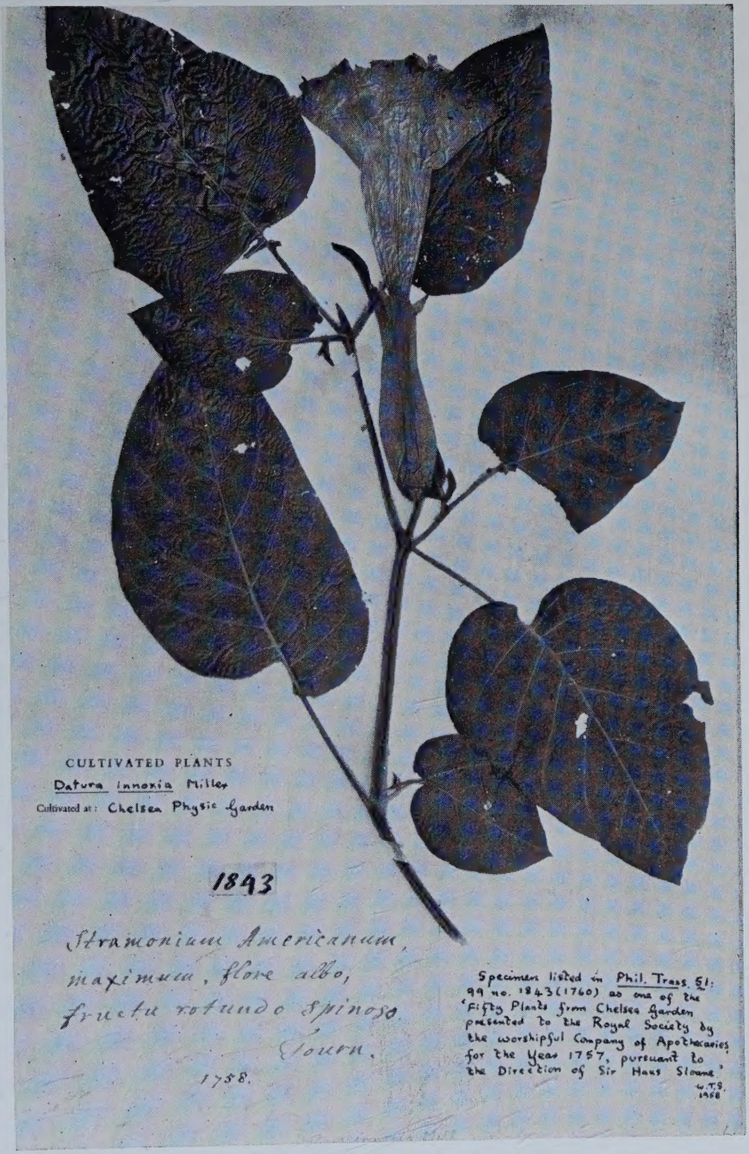

847215
HERBARIUM
FIELD MUSEUM
HERBARIUM HORTI BOTANICI MATRITENSIS
Plantae Novae Hispaniae.
a Sessé, Mociño, Castillo et Maldonado lectae
(1787-1795-1804).
Datura innoxia Mill.
"Datura Metel N."
Nº. 1572

EXPLANATION OF THE ILLUSTRATION

Plate LII. Neotype of Datura inoxia *Miller* preserved in the British Museum.

Photograph sent by J. E. Dandy

PLATE LII



CULTIVATED PLANTS
Datura Innoxia Miller
Cultivated at: Chelsea Physic Garden

1843

Stramonium Americanum,
maximum, flore albo,
fructu rotundo Spinoso.
Tourn.
1758.

Specimen listed in Phil. Trans. 51:
99 no. 1843 (1760) as one of the
'Fifty Plants from Chelsea Garden
presented to the Royal Society by
the worshipful Company of Apothecaries
for the Year 1757, pursuant to
the Direction of Sir Hans Sloane'
W.T.S.
1958

according to the present provisions of the International Code of Botanical Nomenclature (Art. 7, Note 3, 1956), *C. Wright no. 526* should be considered a neotype rather than a lectotype as suggested also by Fosberg in a personal communication to me.

Fortunately, I have seen a specimen from the Chicago Natural History Museum which was collected by Sessé and Mociño and labeled by them as "Datura Metel N." Excepting for the fruit, this specimen is identical with the illustration of *Datura meteloides* DC. (see Plates). Because of this outstanding similarity and since there is no other specimen which could fit the needs, I believe that this must represent the type collection. Inasmuch as the Chicago specimen consists of flowering material only, it seems probable that the fruits in the illustration represent an incorrect addition by an unknown artist. However, I have not yet seen the specimen in the Madrid Herbarium (MA). The Sessé and Mociño specimen mentioned above is a duplicate of the original collection. Therefore, the material in the Madrid Herbarium should serve as type specimen, and the Chicago material, *Sessé, Mociño, Castillo et Maldonado, No. 1572* ! (F no. 847215) as an isotype. *Datura meteloides*, as typified above, is identical with the earlier *D. inoxia* of which it is therefore, a synonym. It is, furthermore, distinct from *D. Wrightii.*

II. The Typification of *Datura inoxia* Miller

Datura inoxia was described by Philip Miller (1768) from plants grown from seed which he had received from "La Vera Cruz." No type specimen was designated at that time, but there are specimens in the British Museum which were cultivated at the Chelsea Physic Garden during Miller's curatorship (1722–1770). In the absence of a type specimen, one of these may serve.

The Chelsea Physic Garden, according to Dandy (1958), "was conveyed in 1722 to the Society of Apothecaries by Sloane (who had purchased the manor of Chelsea in 1712) on certain conditions, one of which was the 'rendering yearly to the President, Council and Fellows of the Royal Society of London, fifty specimens of distinct plants, well dried and preserved, which grew in their garden the same year, with their names or reputed names; and those presented in each year to be specifically different from every former year until the number of two thousand shall have been delivered'." This stipulation resulted in the accumulation of an herbarium of over 3000 specimens taken from the Sloane estate. The lists of plants so prepared were printed annually in the Philosophical Transactions (of the Royal Society) from 1723 to 1774. In 1781, the specimens were transferred to the British Museum and are now incorporated in the general herbarium.

Miller described the Chelsea plants in successive editions of his Gardener's Dictionary and as Stearn communicates, "when there is no specimen extant from Miller's own herbarium. . . . the application of a Miller name can often be determined or checked by a contemporary specimen from the Chelsea Garden, even though such a specimen was not dried and labelled by Miller himself."

There are, in my possession, excellent photographs of two authentic specimens of *Datura inoxia* cultivated at the Chelsea Garden and kindly sent by J. E. Dandy of the British Museum. Having examined these, I hereby designate as neotype the specimen listed in the Philosophical Transactions (of the Royal Society) 51 (1760) 99, no. 1843.

Since *Datura inoxia* and *D. meteloides* are identical, the former binomial which has priority must be taken up for this concept.

Datura kymatocarpa *Barclay sp. nov.*

Caulibus dichotomis, usque ad 40 cm. altis; foliis in ambitu ovatis, apice acutis, basi inaequalibus, margine irregulariter lobatis vel sinuato-dentatis, usque ad 11 cm. longis, dimidio seu duabus-tertiis partibus latis, utrinque strigosis; floribus erectis, axillaribus; pedicellis per anthesin 0.7–1.8 cm. longis, post anthesin elongatis reflexisque; calyce cylindrico, 2.8–4.6 cm. longo, apice 5-dentato, dentibus triangularibus; corolla albida, infundibuliformi, plicata, 6–7.5 cm. longa, orificio 5-dentato, dentibus acuminatis, 3–4 mm. longis; capsula globosa, irregulariter dehiscenti, setis semicapillaceis satis dense obtecta, 2.4 cm. longa; seminibus reniformibus, testa verrucosa.

Caulescent, dichotomously branching annual herbs, reaching 40 cm. or more in height; young branches usually villous, becoming glabrescent with age; leaves alternate, ovate in outline with an acute apex and an unequal base extended into a villous up to 8 cm. long petiole; margin irregularly lobate or sinuate-dentate; leaf blades up to 11 cm. long and usually one-half to two-thirds as broad, variously strigose on both surfaces except along the mid-vein where it is villous in the same manner as the petiole; pedicellate flowers erect, borne in the axils of the branches; pedicels during anthesis 0.7–1.8 cm. long, later becoming somewhat elongated and reflexed; calyx tube cylindrical, 2.8–4.6 cm. long and sparsely pubescent with a 5-dentate apex, teeth triangular in shape, 3–5 mm. long and 3–5 mm. broad at the base; corolla white, funnel-shaped, plicate, terminating in a 5-dentate orifice, 6–7.5 cm. long; the five corolla teeth acuminate, 3–4 mm. long and 3 mm. wide at the base, each of them supported by three conspicuous nerves, the median one

extending to the tip; the margin between each tooth bisinuate and forming an obtuse lobule giving the corolla the appearance of being 10-angled; the five stamens free, epipetalous, attached to the corolla tube at approximately the same level, about 2.5–3 cm. from the base; filaments glabrous, 2–2.3 cm. long; style equalling or slightly exceeding the anthers, 4.6–5.7 cm. long; young ovary covered with spine-like hairs; calyx circumscissile, shed with the corolla, the persistent base expanding into a membranous disk-like structure subtending the capsule, 1.5–2 cm. in diameter on mature fruit; capsule globose, pubescent, pendent on 1.5–2 cm. long pedicels; irregularly dehiscent, covered with semicapillaceous pubescent bristles, up to 2.4 cm. long; seeds reniform, about 5 mm. long and 3.5 mm. wide, seed coat verrucose.

Mexico: State of Mexico, Dist. of Tamascaltepec, Bejucos, "llano," Aug. 15, 1935, *G. B. Hinton et al 8173* (Type in US 1841574).—State of Guerrero, Dist. of Coyuca, Pungarabato, "roadside," July 9, 1935, *G. B. Hinton et al 8030* (F, MO, US): Rio Balsas, Aug. 26, 1910, *C. R. Orcutt 4384* (F).—State of Michoacan, Municipality of Apatzingan, "open sun-baked pasture one-half mile S. of Apatzingan, thick adobe soil, alt. 1200 ft.", July 31, 1940, *W. C. Leavenworth 409* F, GH, MO, NY); Municipality of Apatzingan, "common between thorn forest and road, between Apatzingan and La Majada, alt. 1200 ft.", Aug. 16, 1941, *W. C. Leavenworth & H. Hoogstraal 1615* (F, GH, MO, NY).

This species is known only from the Rio Balsas valley in Mexico. According to Leopold (1950), this valley is a tropical inland basin, cut off from the sea by highlands on all sides. In this basin, one encounters a nearly insular type of endemism, and an appreciable number of new species have been described from the collections of Hinton and Leavenworth from this general vicinity. This new *Datura* was collected by Leavenworth in the vicinity of Apatzingan at an altitude of 1200 feet and in an area designated by him as open, arid, scrub forest, which covers the greater part of the plains of the valley-floor (Leavenworth, 1946).

Datura kymatocarpa may be readily distinguished from all other members of the genus by the semi-capillaceous bristles on its fruit and by its very characteristic seeds (see Plates). The specific epithet is derived from the Greek referring to the wavy hairs on the fruit.

Datura reburra *Barclay sp. nov.*

Pars quae adest usque ad 30 cm. alta, caulibus dichotomis, glabris; foliis in ambitu ovato-lanceolatis, apice acutis, basi inaequalibus, margine irregulariter lobato-dentatis, usque ad 8 cm. longis, dimidio vel duabus-tertiis partibus latis, lamina utrinque glaberrima; floribus pedicellatis, axillaribus, primum plusminusve erectis, deinde post anthesin valde nutantibus; calyce prismatico, carinato-angulato, ca. 6 cm. longo, apice 5-dentato, dentibus satis prominentibus, ovato-lanceolatis, 1.7–2 cm. longis; corolla infundibuliformi, plicata, usque ad 9.5 cm. longa, fauce ampla, 5-dentata, dentibus setiformibus, ca. 5 mm. longis; capsula globosa, puberula, regulariter dehiscenti, pendula, spinis rigidis, acuminatissimis ornata, ca. 2 cm. longa; seminibus reniformibus, lacunis luniformibus utrinque donatis.

Dichotomously branching herb at least 30 cm. tall, but surely more (the specimen at hand is incomplete); young branches strigose, becoming glabrous with age, entire plant appearing glabrous except when young; leaves alternate, ovate-lanceolate in outline, with an acute apex and an unequal base extended into a puberulent petiole, up to 4.8 cm. in length; margins irregularly lobate-dentate; leaf blades mostly incomplete in our specimen, up to about 8 cm. or more in length, one-half to two-thirds as broad, surfaces essentially glabrous except for the sparsely strigose veins; erect pedicellate flowers borne in the axils of the branches; the strigose pedicels during anthesis about 1 cm. long becoming elongated and reflexed with age; prismatic calyx tube 5-toothed at the apex and keeled along the angles, glabrous on both sides, about 6 cm. long; the calyx teeth ovate-lanceolate, 1.7–2 cm. long and 0.5 cm. wide at the base; corolla funnel-shaped, plicate, terminating in a 5-dentate orifice, up to 9.5 cm. long; the five corolla teeth setiform, about 5 mm. long and 2 mm. wide at the base, each of them supported by three conspicuous nerves, the median one extending to the tip; exterior of the corolla tube glabrous, the interior pubescent from the base up to the point where the filaments are attached to the corolla tube, then becoming glabrous above this point; the five stamens free, epipetalous, attached to the corolla tube at approximately the same level about 3 cm. from the base of the corolla; filaments glabrous except near their attachment to the corolla, 2.8 cm. long; anthers about 6 mm. long with filamentous trichomes along the lines of dehiscence; style 7.8 cm. long; calyx circumscissile, forming a reflexed frill, up to 1.3 cm. long, which subtends the fruit; capsule globose, about 2 cm. long, regularly dehiscent by four valves, pendent on pedicels up to 2.2 cm. long; fruits covered with stiff, sharply pointed spines; surface of fruit puberulent, spines glabrous; seeds reniform, about 5 mm. long and 4 mm. broad, with lunate lacunae on the lateral faces and with a triple ridge along the convex edge which forms a cord-like margin around the seed.

MEXICO: State of Sinaloa, vicinity of Culicán, Sept. 14, 1904, *T.S. Brandegee s.n.* (TYPE: UC 103947).

Datura reburra is similar to *D. discolor* Bernh. in having both nodding fruit and regularly dehiscing capsules. It is, however, readily distinguishable by its distinctive seeds, its puberulent fruit with glabrous spines and its smaller flowers. The specific epithet of *Datura reburra* refers to the bristling hairs of the capsule.

The question arises, in connection with this new species, as to the validity of the sections *Stramonium* Bernh. and *Dutra* Bernh. The *Stramonium*-section has been distinguished by erect and regularly dehiscing capsules; the *Dutra*-section by nodding and irregularly dehiscing capsules. Both *Datura reburra* and *D. discolor* are characterized by having nodding capsules that dehisce regularly by four valves. Thus, they provide intermediates between the two sections in question.

Prior to my discovery of *Datura reburra*, Fosberg had called my attention to the vague distinction between these two sections, pointing out the nonconformity of *D. discolor* to either one. This additional species would tend to support the belief that these two sections are untenable, unless we propose a new section for every second or third species. Such a procedure would be definitely absurd.

In light of the genetic and cytological work on *Datura* already completed by the late Dr. Blakeslee and by his co-workers, a more thoroughgoing study of these new species should prove to be profitable. Experimental approaches further our knowledge of plants and their relationships to a great degree. Nevertheless, much can also be learned from a study of herbarium material. In fact, such a study should logically precede experimental lines of research.

Datura vulcanicola *Barclay sp. nov.*

Planta fruticosa, usque ad 3 m. alta; foliis ovatis vel ovato-ellipticis, apice acutis, basi in petiolum decurrentibus, utrinque puberulescentibus, margine integra vel irregulariter sinuato-dentata; floribus solitariis, plusminusve horizontaliter cernuis vel nutantibus arcuatis; calyce glabro, paulo inflato, cylindrico, 4.5–8 cm. longo, apice inaequaliter 2–4 dentato; corolla usque ad 20 cm. longa, urceolata, apice 5-dentata, margine inter dentes breviter retusa; capsula obovata, prominenter bisulcata, irregulariter verrucosa, usque ad 12 cm. longa; semine reniformi, testa glabra; numerus chromosomicus, $2n=24$.

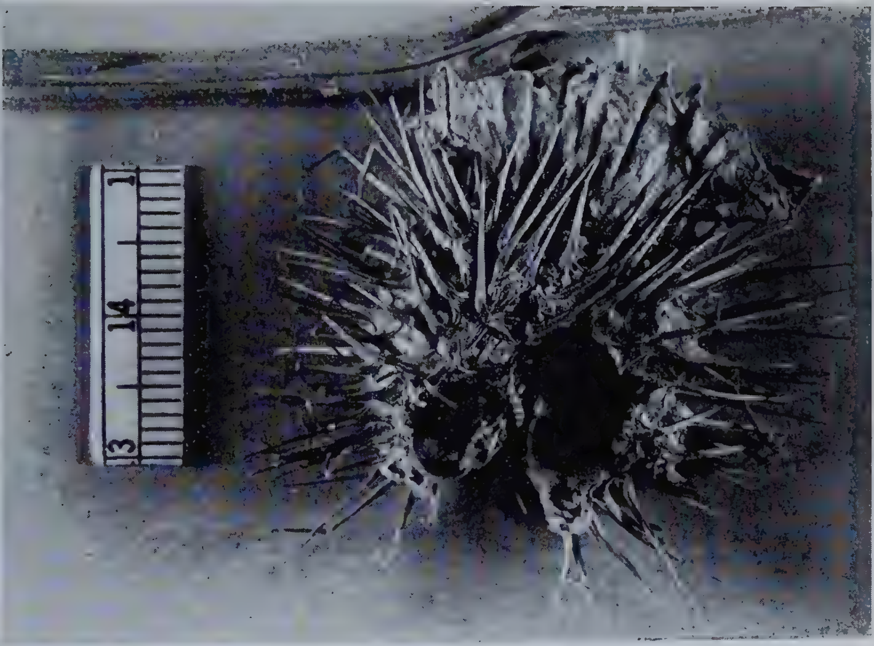
Perennial shrub or small tree reaching 3 meters or more in height; leaves alternate; blades up to 20 cm. long and up to 10 cm. broad, puberulent on both surfaces, ovate to ovate-elliptic in outline with an acute apex and a subequal base decurrent on the up-to-10 cm. long petiole; margins entire to irregularly sinuate-dentate; the larger, dentate leaves occurring on juvenile shoots with the smaller and entire ones on older branches; flowers axillary on somewhat arcuate, 1.5–2.7 cm. long pedicels; corolla tube basally green becoming light red which fades into yellow near the mouth, the veins red, interior of the tube deeply red tinged between the nerves, the upper half yellowish white, becoming deeply yellow near the mouth; calyx glabrous, somewhat inflated, cylindric, 4.5–8 cm. long, often split along one side giving a spathe-like appearance to it; calyx teeth two to four, unequal in length; corolla up to 20 cm. long, urceolate, terminating in a 5-dentate orifice, each tooth supported by three prominent nerves; the margin between the short and acuminate teeth slightly retuse; the five stamens free, epipetalous, extending to just below the mouth of the corolla, attached to the corolla tube at approximately the same level, 7–8.9 cm. from the base; filaments glabrous above, becoming villous near the point of adnation, anthers white, filaments pale green; shortly after anthesis the calyx dehisces at the base of the ovary and is shed; capsules obovate, deeply bisulcate with a secondary shallow division, up to 12 cm. or more in length, warty in appearance; seeds reniform, about 7 mm. long and 5 mm. wide, seed coat smooth on both sides, shiny, slightly

EXPLANATION OF THE ILLUSTRATION

PLATE LIII. *Upper:* Fruit of the type of DATURA REBURRA *Barclay* (*T. S. Brandegee*, s.n., Sept. 14, 1904). *Lower:* Fruit of the type of DATURA KYMATOCARPA *Barclay* (*G. B. Hinton*, No. 8173).

Photograph by CHARLES DILLS

PLATE LIII

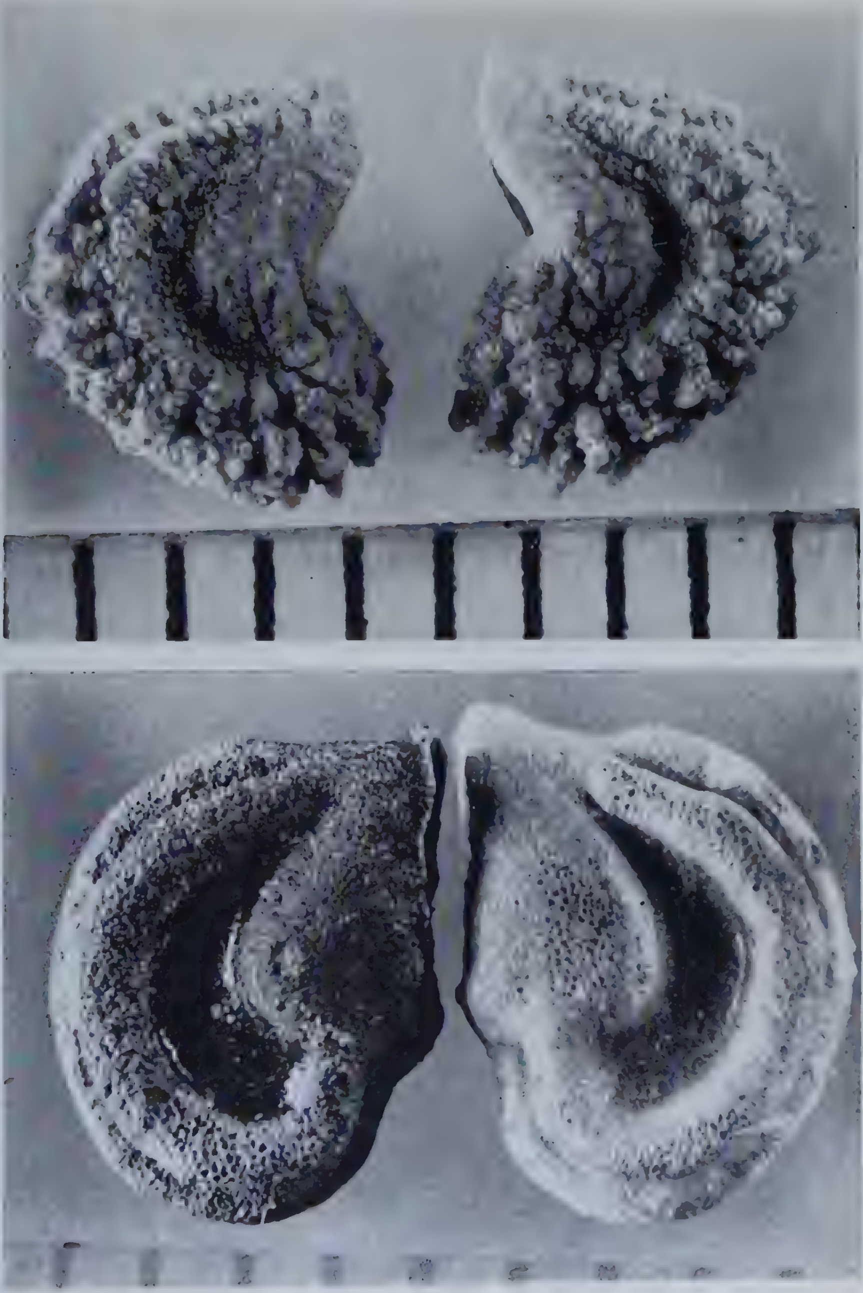


EXPLANATION OF THE ILLUSTRATION

Plate LIV. *Upper:* Seeds of Datura kymatocarpa *Barclay* (*Leavenworth*, No. 1615). *Lower:* Seeds of the type of Datura reburra *Barclay* (*T. S. Brandegee*, s.n., Sept. 14, 1904).

Photograph by Charles Dills

Plate LIV



EXPLANATION OF THE ILLUSTRATION

PLATE LV. DATURA VULCANICOLA *Barclay*. Photograph of the plant from which the type specimen was collected (*A. S. Barclay & R. E. Schultes No. 147*).

Photograph by RICHARD EVANS SCHULTES

PLATE LV

EXPLANATION OF THE ILLUSTRATION

Plate LVI. Datura vulcanicola *Barclay*. Same as Plate LV in flower and fruit.

Photograph by Richard Evans Schultes

Plate LVI

ridged on the convex side; chromosome number, 2n=24.

COLOMBIA: Dept. of Cauca, Municipality of Puracé, northern slope of the Volcán de Puracé, alt. 2700–2800 m., July 23, 1956, *A. S. Barclay & R. E. Schultes 147* (TYPE: GH).—Same locality and date, *A. S. Barclay & R. E. Schultes 149 and 177* (GH).—Between Puracé and its páramo, Chiquín, heath-brush, alt. 2700–3100 m., July 11, 1939, *E. Pérez-Arbeláez & J. Cuatrecasas 5960* (F, US, COL.).—Puracé, alt. 3300 m., Feb. 1938, *K. von Sneidern 1898* (US).—Paletará to Calaguala, alt. 3000–3200 m., July 17, 1922, *F. W. Pennell 7093* (GH, NY, US).

In 1956, during my field studies of the tree Daturas in the Colombian Andes, I was surprised to find on the side of the famous and active Volcán de Puracé populations of what was at once distinguishable as a striking and beautiful new species of the genus. Herbarium specimens, fixed buds for cytological study, about 50 pounds of leaves for chemical analysis and living material in the form of cuttings and seeds for horticulture were gathered.

Earlier specimens which had been collected in the same general vicinity on the slopes of the volcano and which also represent the new species had been filed in our herbaria under the name *Datura sanguinea* Ruíz & Pavón. *D. vulcanicola* seems to be most closely related to *D. sanguinea* on the basis of comparative morphology.

Although *Datura sanguinea* is a highly variable species, *D. vulcanicola* may readily be distinguished from it by a number of characters, among the most prominent of which are its warty fruit and its smooth seeds. The fruit has a hard, almost woody pericarp and is attached to the branch by a stout peduncle which becomes nearly as thick as the branch supporting it. *D. sanguinea*, on the other hand, is characterized by its smooth, more fleshy fruit which is attached by an elongated, relatively unthickened peduncle and by its verruculose seeds.

The flowers of the new species are cernuous or nodding at a 30 to 45 degree angle, with a glabrous, nearly satintextured calyx and corolla. The light red to salmon-colored corolla tube fades into yellow near the mouth. The nerves are red, and the slightly inflated calyx tube dehisces after anthesis. In comparison, the flowers of *Datura sanguinea* are vertically pendulous, variously pubescent, and although the coloration is quite variable, the corolla tube is usually yellow becoming red towards the mouth with conspicuous greenish to yellow nerves. A much inflated calyx tube which is often persistent following anthesis forms a husk around the fruit.

Datura vulcanicola, as far as I could judge, does not reach the great height or corpulence which is commonly found in *D. sanguinea.* The chromosome number of 2n =24 (*A. S. Barclay & R. E. Schultes no. 147*) agrees with that of the other arborescent Daturas investigated.

In a communication to me, Professor Schermerhorn of the Massachusetts College of Pharmacy has related that a preliminary biochemical analysis of the leaves of this new species has shown no significant differences between the alkaloids present in *Datura vulcanicola* and in the other species of *Datura.*

Although *Datura vulcanicola* occurs in large numbers in the subpáramo heath vegetation under conditions which could be interpreted as wild, I am of the opinion that the abundance of individuals at the type locality is probably the result of human activity. My principle reason for believing this is that most of the plants were growing along what are or obviously had been foot paths or donkey trails. Furthermore, we must not overlook the fact that for centuries this agriculturally rich volcanic area has been populated by advanced Indian peoples who are known to have employed Daturas as narcotics in their magic and therapeutic practices. It is interesting to note in this connection, however, that *D. vulcanicola* has not been spread, at least to any appreciable extent, from this locality by primitive man. It may yet be found on neighboring mountains, but neither the comparatively thorough explorations in this general area in the past nor my own collecting, directed almost exclusively to *Datura*, have turned it up elsewhere.

ACKNOWLEDGMENTS

I would like to acknowledge the help and encouragement of my major professor, Dr. R. C. Rollins, who made available to me the Fernald Fund of Harvard University for field work in South America. I also owe a debt of gratitude to Dr. R. E. Schultes who first suggested the genus *Datura* as a research subject and whom I had the privilege of accompanying while in South America. To Dr. Jesús M. Idrobo, Dr. Alvaro Fernandez-Pérez and the other members of the Instituto de Ciencias Naturales, Bogotá, Colombia, I wish to extend my deepest gratitude and appreciation for their kindness and help during my stay in their country.

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THE PRESENT DISTRIBUTION OF NARCOTICS AND STIMULANTS AMONGST THE INDIAN TRIBES OF COLOMBIA

BY

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RECENT extensive and intensive interest in narcotic and stimulant plants on the part of medical and pharmacological investigators has focused attention on the need of knowing more about these plants from the botanical and anthropological points of view. During the past twenty years or so, significant strides have been made in determining the correct botanical sources of plant narcotics and stimulants. Very little has been done, however, toward bringing into some semblance of order the vast amount of information on their distribution, preparation, use and social significance, which is scattered here and there throughout ethnological literature and the writings of travellers.

Forasmuch as Colombia represents one of the regions of the world where the native population has developed to its highest degree the use of plants which act on the central nervous system as intoxicants or stimulants, I propose here to present a preliminary and very much abbreviated survey of the distribution of the use of these plants amongst the Indians of this country.

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I.

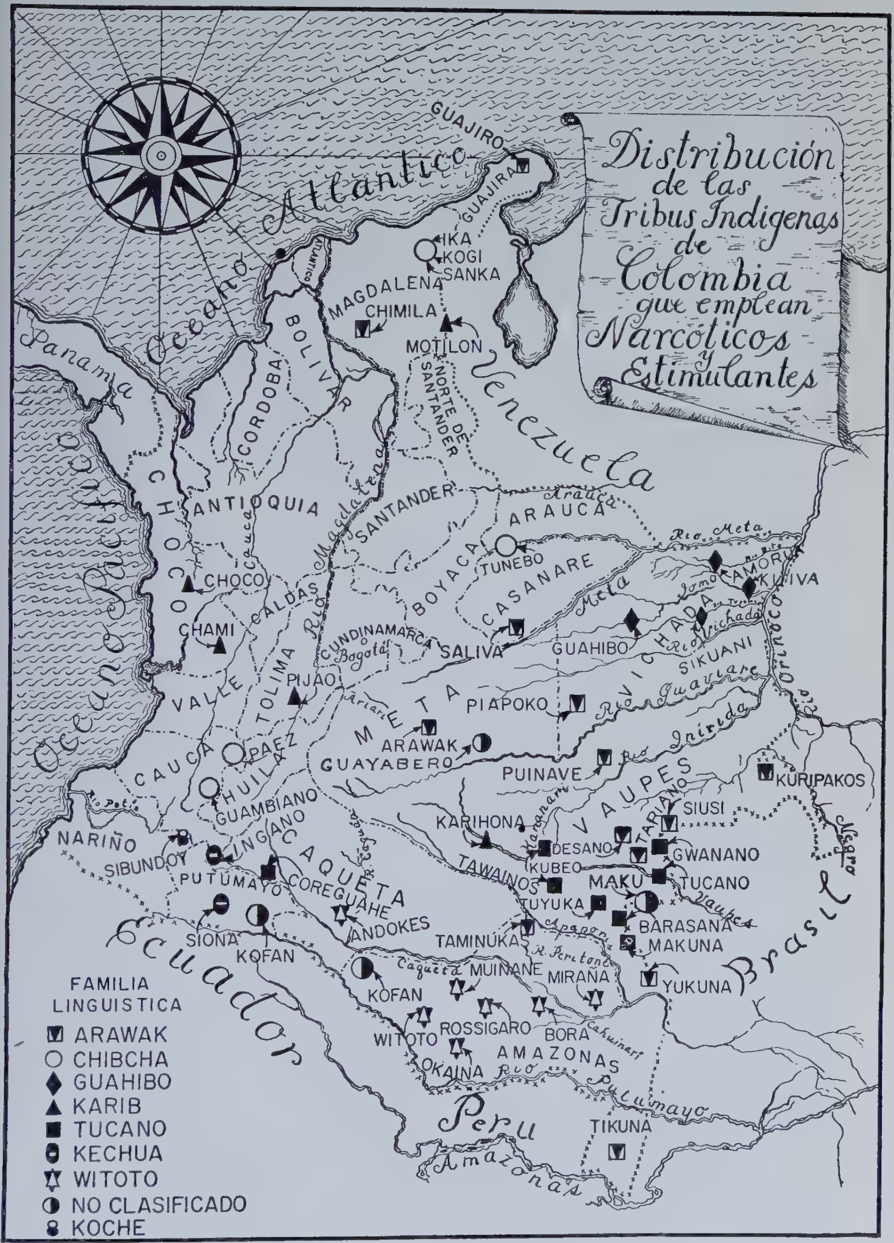
The population of Colombia is a racial mixture that is constantly increasing in complexity. It consists in great part of Europeans, especially from Spain, and of Indians from Middle America, the Antilles, the northern Andes and the Amazonian regions. There are also some negroes, mostly from Africa, who have intermingled with both whites and Indians, especially in some of the Departments. All these groups have contributed their share to the spiritual and cultural complex which man represents in Colombia.

Much of Colombia, sparsely populated and with a dearth of roads, is occupied by Indian tribes which subsist wholly on local resources. The rivers provide these natives with roads, meat and drink; the plant kingdom furnishes their clothing, shelter, food, medicines, stimulants, narcotics and poisons; the animal world supplies food, diversion and other material for magic.

These Indians employ sundry stimulants and narcotics of great potency in both magico-religious rites and in daily life as well. The accompanying map shows the wide distribution of the use of such plants. This is so great that it causes us to wonder why such a complex exists in Colombia.

Many of the naturalists, ethnographers, explorers and geographers who have lived or travelled amongst these Indians have attempted to interpret the reason for the extensive use, and even near-abuse, of stimulants and narcotics in this area. Actually the reason is simple: it is due merely to primitive mentality which is mystical. The Indian considers all nature and the visible and imagined cosmos to be endowed with spirit-forces. He does not recognize any boundary between natural and supernatural phenomena. This reason is in concord with that of Pardal (27) and Frazer (14), but is not in agreement

PLATE LVII


Distribución de las Tribus Indigenas de Colombia que emplean Narcóticos y Estimulantes
Oceano Atlantico
Oceano Pacifico
Panama
Venezuela
Ecuador
Peru
Brasil
GUAJIRO
GUAJIRA
ATLANTICO
IKA
KOGI
SANKA
MAGDALENA
CHIMILA
MOTILON
NORTE DE SANTANDER
BOLIVAR
CORDOBA
CHOCO
ANTIOQUIA
Cauca
Rio Magdalena
SANTANDER
Arauca
ARAUCA
Rio Meta
AMORUA
KUIVA
TUNEBO
BOYACA
CASANARE
Meta
Tomo
Rio Vichada
VICHADA
CHOCO
CHAMI
CALDAS
CUNDINAMARCA
Bogotá
SALIVA
GUAHIBO
SIKUANI
Rio Guaviare
Rio Orinoco
VALLE
TOLIMA
PIJAO
Ariari
META
PIAPOKO
ARAWAK
GUAYABERO
Rio Inirida
PUINAVE
CAUCA
PAEZ
HUILA
GUAMBIANO
Rio Patia
NARIÑO
SIBUNDOY
INGANO
CAQUETA
VAUPES
KURIPAKOS
SIUSI
TARIANO
KARIHONA
DESANO
GWANANO
KUBEO
TAWAINOS
MAKU
TUCANO
Rio Negro
PUTUMAYO
COREGUAHE
TUYUKA
Vaupes
BARASANA
ANDOKES
TAMINUKAS
Apaporis
MAKUNA
SIONA
KOFAN
Caqueta
MUINANE
R. Pira Parana
MIRAÑA
YUKUNA
KOFAN
WITOTO
ROSSIGARO
BORA
Cahuinari
AMAZONAS
OKAINA
Rio Putumayo
TIKUNA
Amazonas
FAMILIA LINGUISTICA
ARAWAK
CHIBCHA
GUAHIBO
KARIB
TUCANO
KECHUA
WITOTO
NO CLASIFICADO
KOCHE

with Taylor's animism theory (48) or Levy Bruhl's prelogical mentality hypothesis (23). There are other more recent theories which, because of the brevity of this article, I do not mention, and which likewise fail to accept a simple explanation for the use of narcotics. Unfortunately, some anthropologists, in studying native peoples, like to presuppose a complex type of mentality. In doing so, they accomplish nothing; on the contrary, they tend only to complicate what is obvious, logical and simple.

Insofar as the narcotics and stimulants are concerned, it has been shown that the highest cultures of America used these plants for religious or magical purposes and that, when the Spanish conquest broke down their religious, social and economic structure, these uses passed from the priestly and noble classes down to the masses who seized upon them to help solve their post-conquest problems. If the employment of narcotics sometimes developed into a commercial exploitation—as with coca in Peru and Bolivia—the immediate cause of this evil lies in intervention by white men (50). The native never looked upon his narcotics and stimulants as sources of pecuniary advantage. In pre-Columbian times, amongst American cultures of lower material and spiritual development, narcotics and stimulants were also used; and they continue to be used at the present time. Likewise, there has always existed—and there still exists—a magical or religious motive for their employment (52).

This is the field in which my own interest lies: an historical and social study of the native cultures of Colombia which are characterized at present by the widespread use of these plants. I am referring here only to present-day cultures, for to discuss the pre-Hispanic civilizations would demand too extensive a treatment.

In an earlier article (50), I have considered the chemical and therapeutic studies which have been made on coca.

These obviously have great practical importance, and the world-wide utilization of the active principle is outstandingly beneficial to man. Nevertheless, I must point out that the chemical studies of these narcotics and stimulants are far from complete. This is due primarily to the poor quality of properly identified materials on which previous investigations have been based. Furthermore, medical and therapeutic studies have usually been made on animals and in surroundings completely different from the natural environment.

The experiences realized personally by some of the naturalists and ethnographers in the use of these plants, so to speak *in situ*, have relative value, and, together with detailed descriptions by travellers or trustworthy natives, they give us some idea of the actual effect of these plants on man. Without in any way detracting from these investigators, we must say that in their accounts of the uses, kinds, collection, preparation, ceremony, symbolism and mythology of narcotic and stimulant plants most writers offer very incomplete data and usually fail to preserve material on which definite botanical determinations may be made. Furthermore, in the case of those naturalists of the past century who wrote down careful notes on the uses of plants and gathered specimens which permitted proper identification, the name of the tribe involved was often not critically determined.

My own experiences with some of the tribes of Colombia, my personal contacts with other investigators with field experience and my recent study of the literature have made it possible for me to clarify and amplify many points which hitherto have been poorly understood. My former purely ethnological approach has, during the past year, been enriched by a botanical panorama, especially in the field of narcotics and stimulants, made possible by the use of the extensive and extraordinarily well organized libraries and museums at Harvard University and by my associations with botanists at this institution.

The present very brief paper on the overall distribution of the use of narcotics and stimulants in Colombia is offered merely as an introduction to a longer and more detailed work on the subject which I am preparing as a Guggenheim Fellow in Ethnobotany at the Botanical Museum of Harvard University.

For help and advice on numerous points, as well as for editorial assistance, my thanks are due especially to Dr. Albert F. Hill and Dr. Richard Evans Schultes of the Botanical Museum of Harvard University; and to Miss Siri von Reis and Mr. Arthur S. Barclay of the Gray Herbarium of the same University. I also wish to thank Miss Ruth Barton for her skillful execution of the map.

II.

PRINCIPAL NARCOTICS AND STIMULANTS USED BY NATIVE TRIBES IN COLOMBIA

Common name	*Identification*	*Distribution*
Coca	*Erythroxylon Coca* Lamarck	Peru, Bolivia, Ecuador, Colombia
	Erythroxylon novogranatense (Morris) Hieronymus	West Indies, Trinidad, Peru, British Guiana, Venezuela, Colombia (15)
Yajé	*Banisteriopsis Caapi* (Spruce ex Grisebach) Morton	Colombia, Brazil, Bolivia, Peru
	Banisteriopsis inebrians Morton	Colombia, Ecuador, Peru
	Banisteriopsis Rusbyana (Niedenzu) Morton	Colombia
	Tetrapterys methystica R. E. Schultes	Brazil (and Colombia?)
Yopo	*Piptadenia peregrina* Bentham	Antilles, Guianas, Venezuela, Colombia, Brazil
Yakee, Yato, Paricá	*Virola calophylla* Warburg *Virola calophylloidea* Markgraf	Colombia, Brazil, Peru, Venezuela

Mets-kwai borrachera	*Methysticodendron Amesianum* R. E. Schultes	Colombia
Tonga, Borrachera	*Datura suaveolens* Humboldt & Bonpland ex Willdenow *Datura candida* (Pers.) Safford *Datura arborea* Linnaeus *Datura sanguinea* Ruíz & Pavón *Datura dolichocarpa* (Lagerheim) Safford	Colombia, Ecuador, Peru
Tobacco	*Nicotiana Tabacum* Linnaeus	Widespread (16)
Yoco	*Paullinia Yoco* R. E. Schultes & Killip	Colombia, Ecuador, Peru

III.

DISTRIBUTION ACCORDING TO LINGUISTIC GROUPS

In view of the lack of any adequate cultural classification of the Indian tribes in Colombia, I am considering the various groups in accord with a linguistic classification, realizing, at the same time, that this has really very little significance insofar as the use of narcotics and stimulants is concerned. I am also discussing the tribes in order from north to south along the Andes and Pacific coastal regions and then across the Amazon valley to the llanos or Orinoco basin.

Guajiro: linguistic family *Arawak*, according to Rivet (38).

The Guajiros inhabit the desert area of the Guajira Peninsula in northeastern Colombia. They employ a tobacco-paste which they chew, especially for magical purposes. The *piache* (witch-doctor) uses a piece of *manilla*, tobacco-paste brought in from Rioacha in the Departamento del Magdalena, Colombia, or from Maracaibo in Venezuela. If *manilla* be unavailable, leaves of *macuira*, a plant similar to tobacco, are chewed to bring about a state of trance for divination (28).

At the present time, the cigars and cigarettes of the white man have become favorites and must likewise be imported, since the climate of the Guajira makes the cultivation of good tobacco impossible. In spite of the restrictions imposed by the climate, I believe that the use of tobacco is an old culture-trait, associated (in the period of the Conquest and in Colonial times) with the employment of coca or *hayo* for chewing, a habit borrowed probably from the neighboring Indians of the Sierra Nevada de Santa Marta. This is attested to by several chroniclers (10, 19). It seems also to be supported by its marked connection with magic; for the *piache* (man or woman), believes himself to be appointed by Wanurú, Spirit of Death, and begins his intoxication by chewing tobacco for several days until a state of ecstasy is attained (29). This ecstasy brings to mind that of the Kogi priests from the Sierra Nevada who induce similar semi-narcotic states through taking coca mixed with concentrated tobacco-water. Differences in concentration of this tobacco-extract account for the different names: *noai* and *mo* or *chimó* (12) referring to a thick paste or jelly-like extract, *ambire* or *ambirá* to the liquid extract or water. It seems that this culture-trait passed from the Sierra Nevada de Santa Marta to the Venezuelan Andes and thence to the east-central region of that country. The Guajiros acquired it at the same time they acquired coca-chewing. Due to difficulty in transporting coca, which cannot be grown in the Guajira, coca-chewing died out, the custom surviving only in magic rituals with the chewing of tobacco or *macuira*-leaves, instead of coca (50, 51).

Kogi, Ika, Sanka: linguistic family *Chibcha*, according to Rivet (38), Holmer (17).

These tribes are known under the generic name Arauacos or Arhuacos, an epithet causing considerable confusion with the name of the linguistic family Arawak.

They dwell on the eastern slopes of the Sierra Nevada de Santa Marta in the northern part of the Departamento del Magdalena (36).

The ancient culture-trait of coca-chewing is conserved amongst these Indians. The coca or *hayo* is mixed with tobacco-extract, *ambirá* (53). Proof of the antiquity of the custom is given by references to it in the chronicles of the Conquest and Colonial periods. Archaeological evidence, especially such finds as stone masks depicting coca-chewing — masks analogous to wooden ones made by these people today — relates these tribes and this culture-trait to the Taironas or Tairos. Linguistically, the word *hayo* stems from Tairona. Furthermore, there are certain other vestiges which indicate that the cultures of the Sierra Nevada have continued for over five hundred years some of the older and similar Tairona culture-traits (50).

Coca and tobacco, amongst the Sierra Nevada Indians, play a wholly religious role and are used in order 1) to enable the subject to fast, 2) to attain complete sexual abstinence, 3) to keep from sleeping and 4) to refrain entirely from speaking of the ‘‘ancestors’’ (that is, to avoid dancing and reciting) (37).

Only the males employ tobacco and coca, because of a strong religious taboo which is widespread throughout Andean cultures.

Coca-plots are put in beside every house or around settlements, where they occupy as much land as is possible, as well as in distant fields. These Indians distinguish three kinds of coca, each kind belonging to different tribes. One variety with long leaves (grown by the extinct Kamkuama tribe); one with small leaves (Kogi); and one with very minute leaves (Ika). Furthermore, it is said that ‘‘the ancients’’ used a tree (unfortunately not determined botanically) of the high moors or *páramos* with leaves like coca and called *guanguara* or *guangula.*

Any person desiring to plant coca must get leaves from the *máma* (priest). Cultivating and working the land is man's work; but harvesting the leaves is woman's task. As coca is a perennial, the leaves can be gathered at any time of the year, The men prepare coca in the houses, a very painstaking chore, since coca is a sacred tree and must be duly respected when it is handled. The leaves are first cleaned of insects, petioles and damaged parts, and are then dried. Then they are put into a pot kept only for this purpose and are toasted over a slow fire in the ceremonial hut. Constant stirring is necessary, for they must not be dried too much, in order to retain a bright green color. When ready, the leaves are put into a small cotton bag (36).

As elsewhere, coca leaves must be mixed with lime before chewing. This alkaline agent is made by burning the shells of bivalves found on the Atlantic Coast. The burning is done on a small pyramidal pile of grasses, and the lime is gathered up in a bottle-shaped gourd (*Cucurbita Pepo*). The gourd, once filled, becomes for its owner a life-long companion; for in the initiation rites, young men are given the gourd and told that it symbolizes woman. The young man is married to this ''woman'' during the ceremony, and he perforates the gourd in imitation of defloration.

The introduction into the gourd and the rubbing motion of the stick are interpreted as coitus, and, culturally, it is understood that all true sexual activity should be repressed and should be expressed only in the use of coca. All biological needs, all frustrations, are thus concentrated in this tiny instrument which, to the Indian, represents *food, woman* and *memory* (36).

Tobacco, amongst these people, is taken according to the native, to make coca more agreeable. Tobacco plots are located near the houses, and their cultivation is left to the men. Women gather the leaves.

As in the case of coca, tobacco has a part in the mysticism of these Indians. Tobacco-concentrate, *ambira*, which, like coca, is kept in a gourd, is prepared by a long steeping of the leaves and by mixing the resulting liquid with *yuca*-starch (*Manihot utilissima*) and *sugii* (*Sorghum* sp.). There is a certain similarity between the use of tobacco in this form and that characteristic of the Witotos of the Amazonas, and, in fact, there is some analogy in the mythology of these two groups of Indians (50).

Motilon: linguistic family *Karib*, according to Rivet (38).

The Yuco, as they call themselves, who live in the Sierra de Perijá, Departamento del Magdalena, belong to the Karib group, but the famous "Motilones" of the Catatumbo appear to be Arawaks (32).

This tribe grows tobacco in a rather primitive manner. In preparing tobacco, they merely hang leaves from the rafters of the houses to dry. The dried tobacco is carefully kept in baskets by the men. Smoking is done only in pipes. Both sexes and all ages smoke, children passing from their mother's breast to pipes. The pipes are of clay with a wooden stem (33).

It seems that the Yuco knew of coca and chewed it until very recently. It has now completely disappeared. Yuco coca-chewing was probably due to commercial relations with the Indians of the Sierra Nevada, for the Yuco did not grow coca, notwithstanding an appropriate climate, and, significantly, it was that fringe of the Motilones nearest Sierra Nevada which knew of the coca-chewing custom.

Chimila: linguistic family *Arawak*, according to Reichel-Dolmatoff (31).

A primitive Indian group, the Chimilas live in the extensive forests occupying the basins of the Magdalena, Ariguaní and Cesár Rivers.

Tobacco-chewing is practiced by the oldest inhabitants. Dried leaves are pulverized between two stones and to the powder is added a small quantity of ashes and some honey. Small cakes about two centimeters long are made of this mass. Occasionally, one may see thick cigars of Chimila-grown tobacco, but the usual way in which the male members of the tribe employ the narcotic is in chewing.

Chami: linguistic family *Karib*, according to Rivet (38).

The Chamí live in Corozal, Municipio de Río Frío, Departamento del Valle.

These Indians have a tobacco-pipe in the form of a small vase with four appendages on the basal edge by means of which four persons at a time smoke the narcotic. This ceramic is exceptional: a collective pipe of such singular construction represents a culture-trait hitherto unsuspected and can logically be considered a ceremonial object. The discovery of clay elbow-pipes also gives us reason to suspect that smoking amongst the Chamí was ceremonial (34, 11).

Pijao: linguistic family *Karib*, according to Rivet (38).

The Pijao comprise three groups representing one ethnic unit living in the southern part of the Departamento del Tolima.

Coca is found amongst these Indians and is used by them in the same way as by the neighboring Paez. Since coca is infrequent amongst Karib tribes and since the Pijao have been neighbors of the Paez from the time of the Conquest, the trait was probably borrowed by the Pijao from their Chibcha neighbors, the Paez, just as the Motilones borrowed it from the Chibchan groups of the Sierra Nevada, and Karib groups in the Amazon acquired it through contact with other tribes (35).

Choco: linguistic family *Karib*, according to Rivet (38a).

These Indians live in scattered groups along the Pacific coast and in the headwaters of the Río Condoto in the Departamento del Chocó.

Some groups of the Chocós use *Datura* (possibly *D. suaveolens*) in magic. According to Wassen (54), these natives probably employ a species of *Datura*, and Seemann (41) asserted as early as 1852 that the Indians of the Chocó prepare a decoction of *Datura* seeds which is sometimes given to children in maize-beer, in which drink its ill effects are said to be counteracted. The Indians believe that persons under the influence of *Datura* (*tonga* or *borrachera*) have the power of divination.

Paez: linguistic family *Chibcha*, according to Rivet (38), Ortíz (26).

This is the largest tribe in Colombia, numbering about 30,000. It is distributed as follows: one part in the Departamento del Tolima, between the Atá and Saldaña Rivers; another and major part in the region called Tierradentro in the northeastern section of the Departamento del Cauca.

The Paez have grown and used coca for more than four centuries. Coca cultivation is carried on in the valleys crossed by the Paez River and up to 2000 meters in altitude.

Amongst these people, coca is mainly a dietary complement, but it is also used in magic and medicine. All members of the tribe, without regard to sex or age, chew coca, and they traffic in it, using it as a monetary medium (50).

As in all Chibchan groups, men plant coca and women harvest it. This is partly in accord with division of work between the sexes and partly in accord with tradition. I believe that, insofar as the women are concerned, there is a magico-religious taboo; but this has in part disappeared due to the influence of Catholic missions and consequent acculturation, even though coca is used in magic in all twenty Paez reservations and the usual Indian mentality is still dominant throughout the Paez population.

Coca leaves are toasted over a slow fire in great earthen pots. When the leaves are dark green with a golden or straw-colored sheen, they are ready for use. They are carried in woven woollen bags, which every Paez Indian wears hanging from the neck. The lime is provided from limestone, abundant in the region, which is broken up by fire. It is kept in a small gourd carried in the coca-bag.

The ‘‘chewer’’ takes a few dried leaves from the bag and places them in the mouth where they are moistened and rolled into a pellet with the tongue. Then a small amount of lime is extracted from the gourd with the fingers, placed in the mouth and mixed with the chewed leaves. This produces the desired effects.

The Paez likewise chew tobacco, principally in magic and medicine (1). Generally, they do not cultivate the plant, buying manufactured cigarettes for the purpose. The shaman employs tobacco mixed with coca during magic-sessions. It seems that the intrusion of tobacco into Paez medicine is not very old. *Borrachero* (a species of *Datura*) is used by the witch-doctor as a venomous narcotic to cause enemies to become insane (1).

Guambiano: linguistic family *Chibcha*, according to Rivet (38).

The seven thousand Guambianos, who dwell in the western part of the Departamento del Cauca, use coca magically in those reservations economically most advanced (Quizgó and Guambía) and in Ambaló as a dietary supplement, but naturally with magical connotations. Coca cultivation has decreased appreciably. The preparation of the leaves is the same as amongst the Paez (50).

Sibundoy: linguistic group *Koche,* according to Ortíz (26b).

The Sibundoy Indians, speaking Kamsá, live in the eastern half of the Valley of Sibundoy.

In their magico-therapeutic rites, they make use of a number of solanaceous plants: *Datura candida, D. sanguinea* and *D. dolichocarpa.* Each of these species of *Datura* has its special native name. There are further, according to Barclay and to Schultes, bizarre forms of these species with deformities due probably to virus-infection, each of which the Indians recognize as a different "kind" of *borrachero* and each destined for a specific magico-therapeutic use. The Sibundoy also possess another curious solanaceous drug, an endemic of their high, mountain-girt valley: *Methysticodendron Amesianum.*

The use of these highly dangerous solanaceous narcotics is restricted to the medicine-men who employ them for divination, prophecy and therapy. The intoxicating effects, which may reach the point of delirium, sometimes last up to several days, with periods of utter unconsciousness.

Only the leaves are used in preparing the intoxicating drink, the infusion taking from thirty minutes to one hour to prepare. The medicine-men never imbibe the liquid all at once, delaying the drinking ceremonially over a two or three hour period. In the case of *Methy-*

sticodendron, tradition dictates that the drug must be taken during the wane of the moon. *Yąjé*, coca and tobacco are doubtlessly present as imported curiosities in the bundles of magic-elements of Sibundoy medicine-men, but none of these narcotics is used widely by the Kamsá people (46).

Siona: linguistic family *Tukáno*, according to Rivet (38), Loukotka (24), Castellví (3), Ortíz (26).

Inhabitants of the Comisaría del Putumayo, between the Sucumbíos and Guamüés Rivers, these Indians are allied linguistically and culturally to the Tukanoan tribes of the Vaupés, from which region they probably came, perhaps at an earlier date than the only other western Tukanoan group, the Koregwahes. They have lived in their present locality, however, at least since Colonial times and have probably adopted some of the narcotics and stimulants from their non-Tukanoan neighbors.

The Sionas use tobacco in the form of cigars and concentrated extract (2). They prepare tobacco in a most curious way which is, in reality, a combination of the cigar-making of the Vaupés Tukanos and the *ambíl*-making of the Witotos: they add peels of unripened bananas and cacao husks, burned and sifted, to the extract. Furthermore, they smoke cigars and use the long, communal ceremonial cigar of the Tukanos of the Vaupés. But they do not, as do the Tukanos and Witotos, use coca, the place of which is filled by *yoco*.

Yoco, a stimulant rich in caffeine, is one of the principal economic plants of the Sionas. Schultes believes that the origin of the use of *yoco* may be Kechwa, since its name, used by all the Indians of the Putumayo regardless of their linguistic affinities, is apparently derived from Inga, a splinter tribe, once numerous, located in the region of Mocoa, speaking a dialect of Ecuadorean highland Kechwa. There is, however, as Schultes points out, no real proof on which to base such a theory (45).

They also take *yajé*, making use of *Banisteriopsis quitense*, *B. inebrians* and *B. Rusbyana*. From these narcotic lianas, they prepare a drink employed preferentially by the witch-doctors for magic purposes. Occasionally, other plants are added to the *Banisteriopsis*, some of which are not malpighiaceous: a species of tree-*Datura*, the amaranthaceous *Alternanthera Lehmannii* and, sometimes, tobacco-leaves (47).

Kofan: linguistic family *Chibcha*, according to Rivet (38) and to Jijón y Caamaño (18a); family uncertain or unknown according to Ortíz (26) and to Mason (24a). Cf. Castellví classification (4).

The Kofáns are located near Puerto Ospina on the Putumayo River and on the Sucumbíos and Guamüés Rivers in the Colombian Comisaría del Putumayo and along the Aguarico River in adjacent Ecuador.

Tobacco is important to the Kofáns. It is used in long rolls or pressed cakes, similar to those found amongst the Tukanoan groups of the Vaupés. Both tribes now import the rolls from Brazil. The Kofáns use also the concentrated extract, which they call *ambíl*, as do the Witotos of the Amazonas (51).

Yajé, made especially of *Banisteriopsis inebrians* and probably also of *B. quitense*, is one of their more important narcotics, and its use is not confined to the priestly or doctoring class.

The Kofáns are the most excessive users of *yoco*, which is consumed daily by all individnals. When the wild supply of this forest vine is exhausted in a region, an entire settlement may move in order to locate itself near a new and adequate supply. It is never cultivated, since it is such a slow-growing liana (47).

Inga: linguistic family *Kechwa,* according to Ortíz (26b).

This reduced group of Indians, now living near Mocoa in the Comisaría del Putumayo, is probably a remnant of a former Kechwa expansion from the highlands eastward over the slopes of the Andes in southern Colombia.

These Inga Indians are much given to the use of *yajé,* made normally of *Banisteriopsis inebrians* or *B. Rusbyana,* sometimes with non-malpighiaceous admixtures. They refer to the narcotic also as *ayahuasca,* a generalized Kechwa name meaning "vine of the dead." *Yajé* also finds use amongst the Ingas as a violent purgative. For magical purposes, *yajé* is taken sometimes only by the shaman and sometimes by any male member of the tribe under the supervision of the shaman (47).

The Ingas likewise use *yoco* daily as a stimulant. Coca is never chewed by members of this tribe (45).

Koregwahes: linguistic family *Tukano,* according to Rivet (38), Mason (24a).

The Koregwahes, like the Sionas, probably came westward from the Vaupés in pre-Colonial times, but apparently at a later date. Quite possibly they brought the coca habit with them.

Unlike the Sionas, however, they do not use tobacco, but have adopted *yoco* and *yajé.* I cannot dare to guess from whom they borrowed the use of *yajé* (8), because almost all of the tribes of the Putumayo, Amazonas and Vaupés use it.

Witoto: linguistic family *Witoto,* according to Koch-Grünberg (20), Rivet (38), Castellví (7), Ortíz (26).

The Witotos are dispersed in several localities of the Colombian Comisaría del Amazonas, especially along the Karaparaná and Igaparaná Rivers, and in adjacent parts of Peru. The tribe suffered dismemberment through the exodus of many groups around the first of this century, as a result of persecution during the rubber boom. Due to years of harsh treatment as virtual slaves in rubber work, they suffered also much cultural disintegration in this period.

They use a tobacco-concentrate, a syrup-like or semi-solid extract of a deep brown color, called *yera*, *yeras* or *djerabe* (49, 21, 6).

The largest and greenest leaves from the lower part of the plant are boiled slowly in a large earthen pot for several hours. Before the extract becomes thick, it is taken from the pot, and alkaline salts are added to it. These salts are prepared from the petioles and leaves of a species of *Chamaedorea* and from the young shoots of a species of *Bactris*. They are called *cha-pe-nas* in Witoto and are obtained by the evaporation of the water which has been passed through the ashes of the aforementioned plant materials (42).

The preparation of *ambíl* differs little amongst the sundry groups of Witotos, and this culture-trait has its roots deep in Witoto history and mythology (28). There is a surprising similarity between this use of tobacco, and that of the tribes of the Sierra Nevada de Santa Marta. To explain this through cultural parallelism would be too premature, and it is necessary to delve a bit deeper into the history and mythology of the two tribes to arrive at a satisfactory solution.

Usually the Indians employ *ambíl* together with coca, but they occasionally use it alone. Witoto women do not chew coca, though some take tobacco. It would seem that the vestiges of an ancient taboo against the use of these narcotics by women still exists (50).

Coca preparation likewise presents reminders of ancient ceremonials. The fresh green leaves, toasted brown in an earthen pot, are pulverized, and the powder is mixed with ashes of the *yarumo* trees (*Cecropia* spp., especially *C. peltata* L.). This mixture is sifted through pounded bark-cloth and is thus made ready for chewing (42).

Even though the use of these two plants has lost much of its ancient ritualistic savor, they are still taken at important or special meetings or councils, where critical tribal business is discussed or tribal history and tradition are recited (25).

One naturally finds certain slight variations in the preparation of tobacco and coca within the Witoto groups, especially between the Witotos themselves and the Boras. The Boras live more apart from missionary influence than do the Witotos to-day and, consequently, have preserved more of their old traditions and indigenous culture. Some students, such as Rivet (38), believe that the Boras belong to the Tupí-Guaraní linguistic family, whereas others, like Castellví, hold them to represent a distinct family. Jijón y Caamaño (18a) maintains that the Boras are related to the Witotos. My personal belief is that only a closer study of the Bora language can solve this riddle, even though it is clear from the reports of reliable travellers that Witotos and Boras converse together in their respective languages and understand one another with difficulty. Culturally, however, the Witotos and Boras, neighbors for centuries, are extremely close, and we have discussed them here with the Witotos for this reason.

Cigars are smoked amongst some of the Witoto groups to the north. The cigar is made with a banana-leaf wrapping and the tobacco is that commonly cultivated by the Witotos (51, 18).

Finally, we can point to the use by the Witotos of the hallucinogenic narcotic *ayahuasca* or *yajé* (*Banisteriopsis* spp.), though apparently on a rather reduced scale. Here the use of *ayahuasca* is commonly restricted to the shaman and has not extended itself to the whole population.

The Miraña (Miranya) Indians, now much reduced in numbers but once widely feared for their war-like characteristics, are usually classified linguistically as Witotoan. According to information which I have received from travellers and others who know the Mirañas, I believe that there may be very good reason for suspecting that they are not Witotoan and that they may perhaps constitute even a distinct family. They now dwell near La Pedrera on the Caquetá River and along the lower reaches of the Kawinarí River, a southern tributary of the Caquetá. There are also groups of Mirañas in adjacent Brazil.

Because of long proximity, the Mirañas are culturally, in many respects, similar to the Witotos and Boras. They use coca in large quantities in daily life and are said to employ tobacco in the form of snuff and *ambíl.* There seems to be no report that they take *caapi.*

Tukano: linguistic family *Tukano,* according to Rivet (38), Castellví (5), Mason (24a) and others. Cf. the classification of Koch-Grünberg (21).

Tukano represents one of the most important linguistic families of South America. The sundry Tukanoan tribes dwell for the most part in the Comisaría del Vaupés and in adjacent Brazil. The more important tribes in the Colombian Vaupés are the Gwananos, Piratapuyos, Taiwanos, Makunas, Barasanas and Djis. The Kubeos are usually classified as Tukanoan, but there may be reason for questioning their belonging to this linguistic family. They represent the culture of the tropical forest, are agriculturists, fishers, river-travellers, use the hammock and know the art of ceramics. Socially, they are fratricidally organized (14a).

Tobacco, coca, *paricá* and *caapi* are the narcotic plants that figure in their daily life as well as in therapeutic and magic rites (43, 47, 50, 51).

The great cigar, made from rolled tobacco leaves covered with leaves of maize, banana or other plants or with the soft inner bark of an unidentified annonaceous tree, is characteristic of the Tukanos. Held in an artistically turned forked wooden support, this three-foot cigar is smoked in certain festival ceremonies. Its use is, however, on the wane (51).

Tobacco is also the basis of a snuff amongst these Indians. The leaves are dried and pulverized, and the resulting brown powder is mixed with an equal amount of ashes from any of a number of plants. The final snuff is greyish. Both sexes may partake of tobacco-snuff which is rather commonly used. It is kept in a case made from large land-snails with a tube or mouth fashioned from a bird bone.

Banisteriopsis is taken by any male member, even though its use is essentially in magic. It is customarily employed during various dances which take place more frequently during the rainy season. Occasionally, treatment of disease or exorcism are practiced during *caapi*-dances. *Caapi* is perhaps best known as the strong narcotic given to enhance the bravery of Tukano boys about to undergo the violent physical ordeal connected with their initiation ceremony—the Yuruparí Dance (47).

The Tukanos likewise use a snuff prepared from the blood-red resin of certain species of the myristicaceous tree, *Virola*, especially *V. calophylla* and *V. calophylloidea*. It is commonly known as *pa-ree-ká* amongst the Tukanos, though this is a Tupí-Guaraní loan-word. The Puinaves call this intoxicating snuff *ya-kee*, the Kuripakos *ya-to*. It is prepared by boiling the resin for many hours and allowing it to sun-dry to a hard mass which is then pulverized. An alkaline admixture of ashes of bark from a species of wild cacao-tree (*Theobroma subincanum*) is added to the powder, and the resulting preparation is sifted to form the final snuff. Unfortunately, this has been widely confused in anthropological literature with an intoxicating snuff made from the leguminous seeds of *Piptadenia peregrina*, a narcotic used in Colombia by non-Tukanoan tribes inhabiting principally certain western tributaries of the Orinoco River (43, 43a).

Desano and **Tariano:** linguistic family *Arawak*, according to Rondon (39a), and Schultes (personal communication). Cf. the classification of Koch-Grünberg (22).

These two Arawak tribes live along the lower part of the Colombian course of the Vaupés River and on affluents of it, in a long and close geographic and cultural proximity to the Tukanoan groups of the region.

Their use of coca, *caapi* and tobacco are similar in all respects to those of the Tukanos. They also know and employ *paricá* or *Virola*-snuff as do their Tukanoan neighbors (43).

Tikuna: linguistic family *Arawak*, according to Castellví (3).

The Tikunas live in the Trapecio Amazónico of Colombia and adjacent parts of Brazil and Peru. They employ tobacco in the form of a cigar (9, 25a), and there are reports that they conserve the use of the pipe for smoking (51, 25a). They likewise use *paricá* or *Virola*-snuff. I once believed, on the basis of a reference by Tessmann and Nimuendajú (25a), that the Tikunas employed *yopo*, but since *Piptadenia peregrina* is not known in their area and bearing in mind Schultes' notes on the distribution of *Virola calophylla* and *V. calophylloidea*, I now believe, even in the absence of botanical specimens, that we may be justified in assuming that they make their narcotic *paricá* from *Virola.* Furthermore, Nimuendajú states that Tikuna snuff is made from the bark of a tree.

Yukuna: linguistic family *Arawak*, according to Koch-Grünberg (22), and Schultes (personal communication).

The Yukunas, who inhabit the uppermost reaches of the Miritiparaná River in the Comisaría del Amazonas, have now almost fully absorbed a once-large tribe of unknown linguistic grouping, the Matapies. The Yukunas are great chewers of coca and employ tobacco-snuff to excess. They use tobacco also in the form of a thick extract and in long cigars, as do their Tukanoan neighbors. *Banisteriopsis* spp. are likewise employed to make a narcotic drink in ways similar to those of adjacent tribes, even though the extent of the employment of this drug is much smaller than that of the Tukanoans to the north (47).

Tanimuka: linguistic family *Arawak*, according to Schultes (personal communication).

The Popeyacá River, affluent of the Apaporis and located near Yukuna country in the Comisaría del Amazonas, is the present center of a Tanimuka population which is small. A split group of Tanimukas early in the present century fled to the distant headwaters of the Igarapé Peritomé, a small tributary of the Apaporis upstream from the Popeyacá, to escape persecution by rubber workers

The Tanimukas use coca, tobacco and *yąjé* in exactly the same way as do their neighbors, the Yukunas. The Peritomé-Tanimukas prepare their coca in a very exclusive and wholly distinct form from any other Indians of the Andes or Amazon.

In 1957, Schultes (46) published a note on their novel formula. Powdered coca and its accompanying ashes are treated with smoke from the burning resin of *Protium heptaphyllum* by means of long tubes through which the smoke is blown into the center of a pile of coca-powder. A resinous, aromatic savour is thus given to the coca which greatly improves its taste. This method is an astonishing refinement in coca-preparation and gives cause to wonder whether the Amazon Indians acquired coca in pre-Hispanic days, since this refinement was not mentioned in the Spanish chronicles nor by the Colonial writers nor by subsequent travellers and naturalists. It is also true that these peoples are next to unknown and that few modern naturalists and no earlier chroniclers ever got into their area. Here is most certainly a good case for independent invention, and probably a recent one, since the main group of Tanimukas in the Popeyacá still prepare coca following the general Amazonian method. They sometimes, however, journey for several days to the Peritomé to buy the incensed coca for special occasions from their separated brethren.

Maku: linguistic family or families undetermined, according to Schultes (personal communication). Cf. the classification of Koch-Grünberg (22).

In the little-known forests between the lower Apaporis and Vaupés Rivers of Colombia and in adjacent Brazil, there live groups of nomadic Indians collectively called *Makus.* There appear to be a number of distinct languages involved, at least one of which has been thought, perhaps on superficial evidence, to be remotely related to Puinave. The Makus, who practice no agriculture, have no canoes, build no houses and use no clothing, are extremely primitive in all respects. Some individuals have been enslaved for manual labor by the strong Tukanoan tribes.

Little is known of the Makus. We do know that, as nomadic forest-dwellers, they have a keen knowledge of plants: they acquire machetes from Indian groups of higher culture by preparing for barter a type of curare or arrow-poison which has the reputation of being the best of the entire region. Schultes, who has contacted several groups of Makus, states that, since they cultivate no plants, they chew coca and use tobacco only when visiting settled Indians of other tribes but that they apparently do use *caapi* from wild sources. On the Colombo-Brazilian boundary, Schultes (47) discovered amongst a group of Makus, and experimented with, a new kind of *caapi*, made from *Tetrapterys methystica*, a genus related to *Banisteriopsis*. It is a narcotic prepared from wild lianas and is apparently not cultivated. We have no knowledge as to whether this *caapi* is used only by the Makus or not, but it has not yet been detected amongst the Tukanos.

Karihona: linguistic family *Karib*, according to Mason (24a).

At the present time, there are two isolated groups of Karihonas; one at the headwaters of the Vaupés River, the other in and near La Pedrera on the Brazilian frontier of the Caquetá River. These two groups migrated to their present sites about 1914 from the distant headwaters of the Apaporis River, where they had an internecine war and were decimated by small-pox brought in by white balata-explorers.

They use *yajé* and tobacco, the former as a concentrated drink, the latter as a snuff.

Tunebo: linguistic family *Chibcha*, according to Rivet (38b).

Inhabitants of the humid jungle regions in the southwestern part of the Comisaría de Arauca, still a very poorly known area, the Tunebos are best understood through the works, partly unpublished, of Padre Henri J. Rocheraux (39). The tribe, which to-day is very reduced in size, preserves many primitive customs. They use coca as well as *yopo.* Fresh coca-leaves are toasted but not pulverized. Upon chewing, the leaves are mixed with lime. This is a purely Andean culture-trait. The custom of snuffing *yopo* was acquired probably from their Arawak neighbors in Venezuela and Colombia, for we have information about Tunebo movements to and from various points in southern Venezuela and northwestern Colombia. The Tunebos, according to Rocheraux (39), employ tobacco in the form of a masticatory, using air-dried leaves. A quid is made of these and is chewed. Formerly they did not smoke but recently they have learned this habit from contact with the white man.

Various tribes. Finally, we must consider some tribes located between the Meta and Inirida Rivers, most of which belong to the Arawak and Guahibo linguistic families. The tribes in question are the Puinaves (24), Piapocos (24a), Guayaberos (according to Meden, personal communication) and Guahibos, Kuivas, Amoruas, Sikuanis, Salivas (30) and Kuripakos, according to Schultes (personal communication).

All of these use or were formerly acquainted with *yopo,* especially for purposes of magic. *Yopo,* prepared from the toasted and pulverized seeds of *Piptadenia peregrina,* is normally taken only by the men, for there exists a certain taboo which, however, does not now seem to be so strict as it once was. In the most acculturated of these people, both sexes take it. Snuffing of this violent intoxicant, which looks rather like ground coffee, is carried out with very different kinds of instruments, the most generally used of which is a double Y-shaped tube of bird bones (the arms of the Y being soldered into place with pitch) ending in two hollowed palm-nuts. These nuts are placed at the opening of the nostrils, and the powder is inhaled from the palm of the hand. Another kind is the long V-shaped snuffing tube, one leg of which is inserted into a nostril, the other into the mouth, thus making self-administration possible. There are additional types of snuffing-tubes as well, both of bone and of small bamboo-like grasses. One other primitive type is made of a palm-leaf: the apex of the leaf is cut off truncated, and this funnel-shaped end is placed over the snuff, while the snuffer draws in strongly through the petiole which is bound into a tube (30, 55).

Generally, some kind of wooden mortar and pestle is used to grind the *Piptadenia*-seeds which have previously been roasted in the fire. The powder is kept in a case made of the leg-bone of the jaguar, partly closed with wax and adorned with feathers. The addition of an alkaline admixture may or may not be the practice.

This narcotic is employed, especially by shamans, for the hallucinogenic effects produced by bufotenine, an active principle believed to be responsible for the startling activity of the intoxication (13).

These tribes of the llanos areas of Colombia likewise take tobacco, usually in the form of large cigars wrapped in very fine maize husks (30).

The Piapoko, Puinave and Guahibo Indians make use of *yajé* but not as a drink. The bark of the root of the vine is simply chewed, and narcotic effects are said thus to be induced.

IV.

In summary, I may say that all that has been attempted in this article is an overall picture of the very extensive use of narcotics and stimulants by the indigenous population of Colombia. This is a country highly developed spiritually, intellectually and materially. The use of these plants in the native cultures of a country with such a modern civilization represents, paradoxicallly, a condition far in advance of that usually found where native cultures frequently weaken or disappear. It demonstrates for the indigenous civilizations of Colombia a spiritual power and a cultural balance as well as the existence in the mind of the native of a fixed purpose in his use of narcotics. It is likewise significant and of a value beyond measure for science that we can look in this present age to such a rich knowledge of economic plants by primitive peoples. Here we have at hand the possibility of studying materials *in situ*. For botany, for anthropology and for medicine, Colombia is a seemingly inexhaustible treasure-house.

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PLANTAE COLOMBIANAE XV

PLANTAE NOVAE COLOMBIANAE ORIENTALIS DESCRIPTIONES

BY

RICHARD EVANS SCHULTES

OUR continued investigation of recently collected Colombian plants, especially those from the northwesternmost part of the Amazon Valley, has brought to light several species hitherto apparently undescribed. Descriptions of these concepts are offered in the present paper.

Gratefully I acknowledge the artistry of Mr. Johann Gumppenberg who has made the line-drawings published herein. My thanks are due also to the National Science Foundation for a grant which made possible the drawings and their publication.

CYCLANTHACEAE

Cyclanthus indivisus *R. E. Schultes sp. nov.*

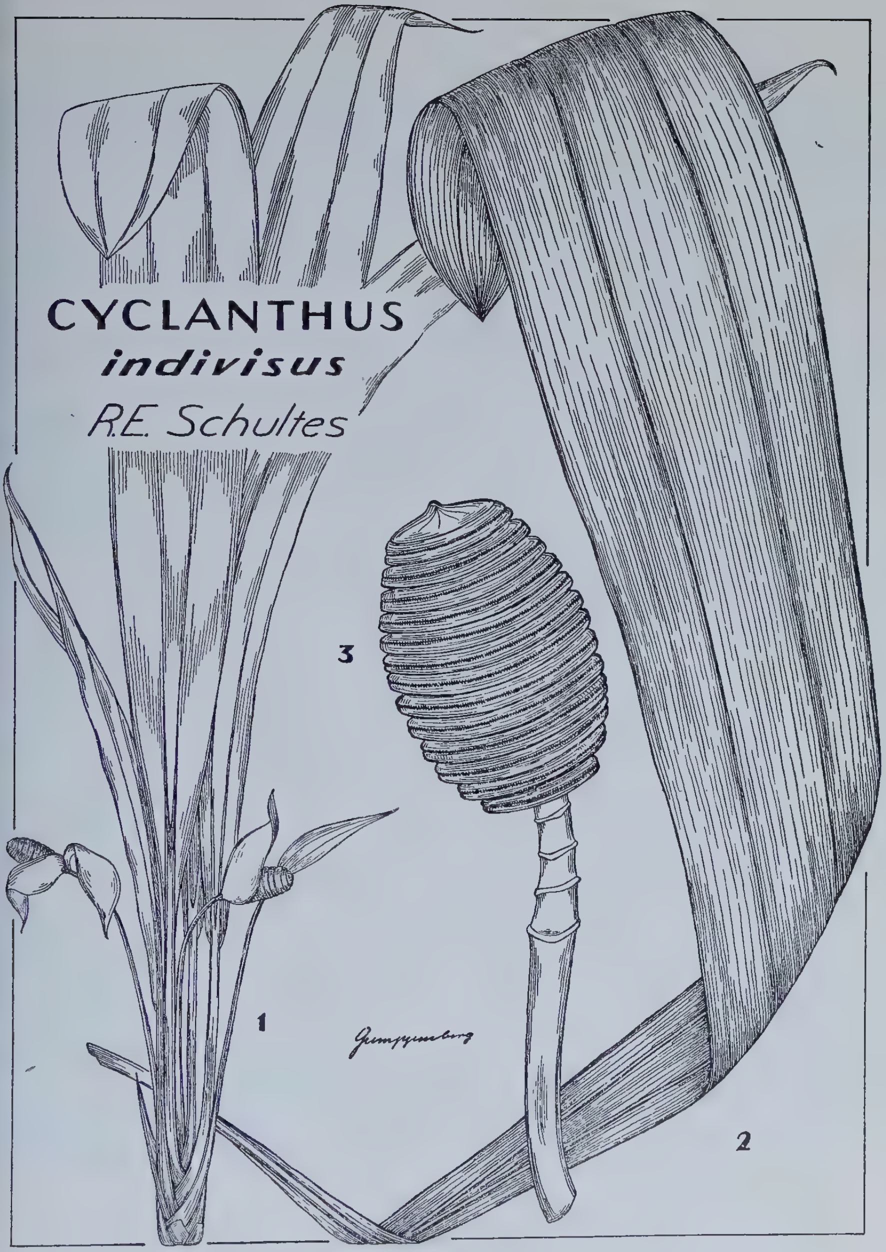
Planta terrestris, acaulescens, usque ad 130 cm. alta. Petiolus 30–40 cm. longus vel brevior, leviter angulatus. Lamina tenuiter sed firme chartacea, concoloria, integra (non bifida), oblanceolata, 90–115 cm. longa, 10–15 cm. lata, apice acuminata, basi sensim acuminata, bicostata, robustis cum nervis principalibus stramineis, nervulis parallellibus plusminusve quattuorviginta. Inflorescentiae axis atropurpureus, teres, aliquid carnosus, 30–45 cm. longus, 0.6–10 mm. in diametro. Spathae quattuor, exteriores extus virides sed intus flavae, interiores utrinque flavae apicem versus rubrae. Spadix breviter et late cylindricus, 6–7 cm. longus, 25–45 mm. in diametro, ma-

EXPLANATION OF THE ILLUSTRATION

PLATE LVIII. CYCLANTHUS INDIVISUS *R. E. Schultes.* 1, habit drawing of plant, approximately one eighth natural size. 2, mature leaf, approximately one quarter natural size. 3, spadix, approximately three quarters natural size.

Drawn by JOHN GUMPPENBERG

PLATE LVIII



EXPLANATION OF THE ILLUSTRATION

Plate LIX. Habit photograph of Cyclanthus indivisus *R. E. Schultes* at Soratama, Río Apaporis, Amazonas, Colombia.

Photograph by Richard Evans Schultes

LATE LIX

turitate purpureus vel atrorubrus, flavis cum florium cinctis. Flores vanilli-fragrantes, valde eis *Cyclanthi bipartiti* similes sed staminibus multo majoribus.

Cyclanthus indivisus grows together with the widespread *C. bipartitus* Poir., but it is easily distinguished in the field by its usually much smaller size, its entire leaf-blades and its shorter and stouter spadix. The ripened spadix in *Cyclanthus bipartitus* is commonly about eight times as long as its diameter; that of *C. indivisus* in length apparently never measures more than five times its diameter and may often be shorter. In the former species, the spadix is most often entirely whitish yellow; in the latter, it is a beautiful purple-red with yellow bands of flowers.

COLOMBIA: Comisarías del Amazonas y Vaupés, Río Apaporis, Soratama (entre el Río Pacoa y el Río Kananarí). "Growing out of ground directly. Fruiting stalk purple. Outer bract green outside, yellow inside. Inner bract yellow inside, red towards tip. Latex (!) white. On floodland." August 20, 1951, *Richard Evans Schultes & Isidoro Cabrera 13680* (TYPE in Herb. Gray).

ARACEAE

Anthurium polyschistum *R. E. Schultes & Idrobo sp. nov.*

Planta epiphytica. Caudex scandens, circiter 0.7 cm. in diametro, internodiis plusminusve 8 cm. longis. Cataphylla coriacea, 3 cm. longa, persistentia. Petiolus teretiusculus, leviter sulcatus, apice breviter geniculatus, lamina plusminusve aequalis, 20–23 cm. longus. Folia membranacea, laete viridis, profundissime 12–15-secta, segmentis anguste lanceolato-ensiformibus, apice acuminatis, basi sensim attenuatis, petiolulo brevissimo, ad 20 cm. longis, 1–2 cm. latis, nervo collectivo a margine 1–2 mm. remoto et nervo centrali siccitate stramineo robusto. Pedunculus 25 cm. longus vel longior. Spatha albido-viridis, elongato-lanceolata, apice acutissima, usque ad

12 cm. longa, basi 1–1.3 cm. lata. Spadix apparenter sessilis, cylindricus, usque ad 10 cm. longus. Tepala interna pallida. Staminum filamenta alba; antherae flavae. Ovarium viride, oblongum. Fructus adhuc ignotus.

Anthurium polyschistum appears to be nearest to the poorly understood *A. eminens* Schott. It differs, however, in being a crawling epiphyte, not an "arborescent" plant, in having much smaller leaves, a much shorter petiole, a spadix only one-fifth as long, and in the color of the spathe. *Anthurium polyschistum* is, in general, a much weaker and smaller plant.

Colombia: Comisaría del Amazonas, Trapecio amazónico, Amazon River watershed. Loretoyacu River. Alt. about 100 m. March 1946, *Richard Evans Schultes 7179* (Type in U.S. Nat. Herb. 1996025).

Urospatha antisylleptica *R. E. Schultes sp. nov.*

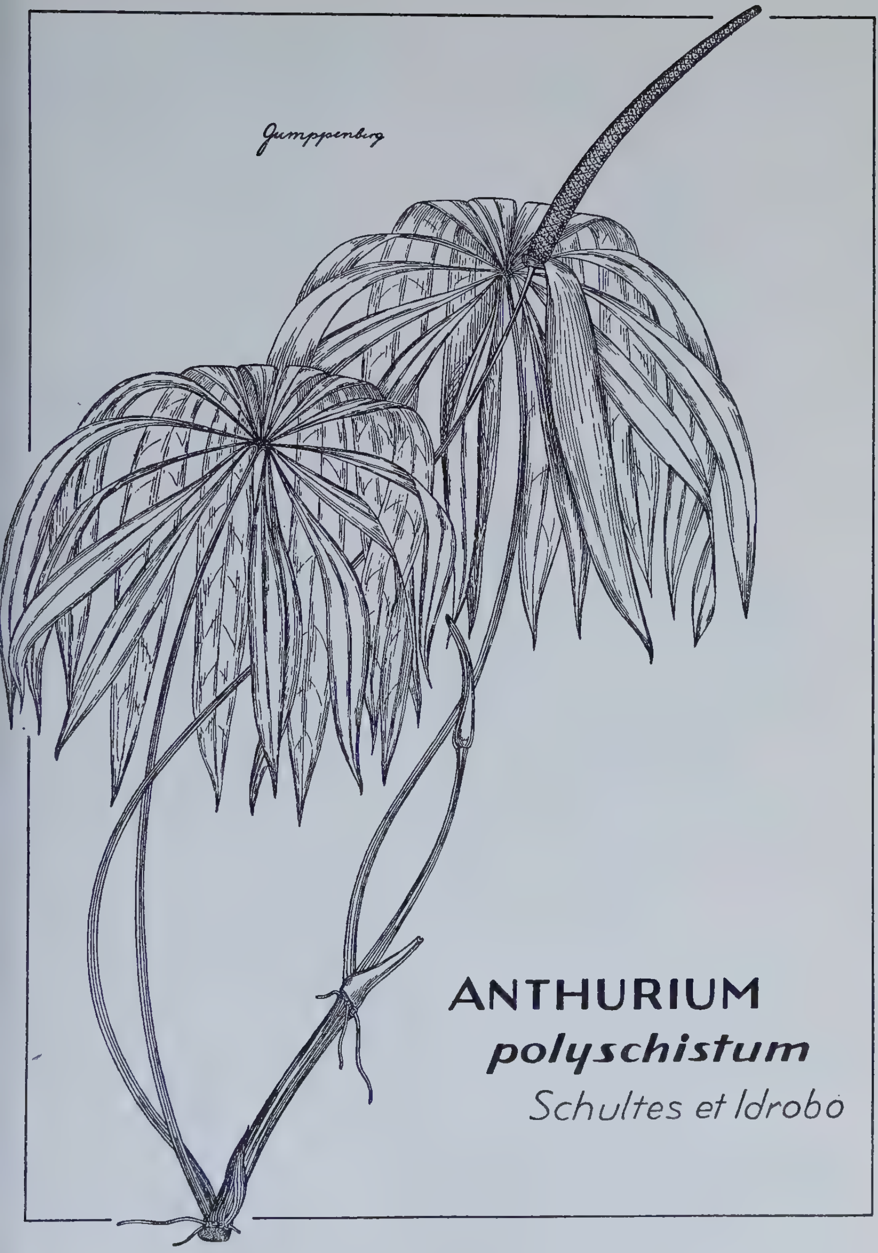
Herba silvatica paludosaque, usque ad sex ped. alta. Foliorum petiolus succulentus, comparate tenuis, glabrus, leviter striatus, atroviridis maculis cinereo-viridibus et atropurpureus variegatus, usque ad 150 cm. longus; lamina hastata, statu adulta usque ad 80 cm. longa; lobus anticus lanceolatus, usque ad 47 cm. longus, basi 13 cm. latus, basi (petioli apicem versus) callo valde atrosanguineo conspicuoque; postici late lanceolati, illi subaequilongi, parte latiore usque ad 14 cm. lati; lateralibus primariis lobi antici subconspicuis angulo acutissimo 15–20° adscendentibus, infimis interlobariis costae posticae breviter adnatis, bicruribus, superioribus duo in lobi parte apicali exeuntibus; costis posticis in sinu longe (5 cm.) denudatis. Pedunculus petiolis sed gracilior glabrus, similiter variegatus, usque ad plusminusve 115 cm. longus, cum spatha foliis multo brevior. Spatha aperta spiraliter contorta, elongato-lanceolata, longissime acuminata, extus viridi-purpurea, intus pallide viridia sed basim versus rosea, usque ad plusminusve 33 cm. longa. Spadix ses-

EXPLANATION OF THE ILLUSTRATION

PLATE LX. ANTHURIUM POLYSCHISTUM *R. E. Schultes & Idrobo.* Habit drawing approximately one half natural size.

Drawn by JOHN GUMPPENBERG

PLATE LX



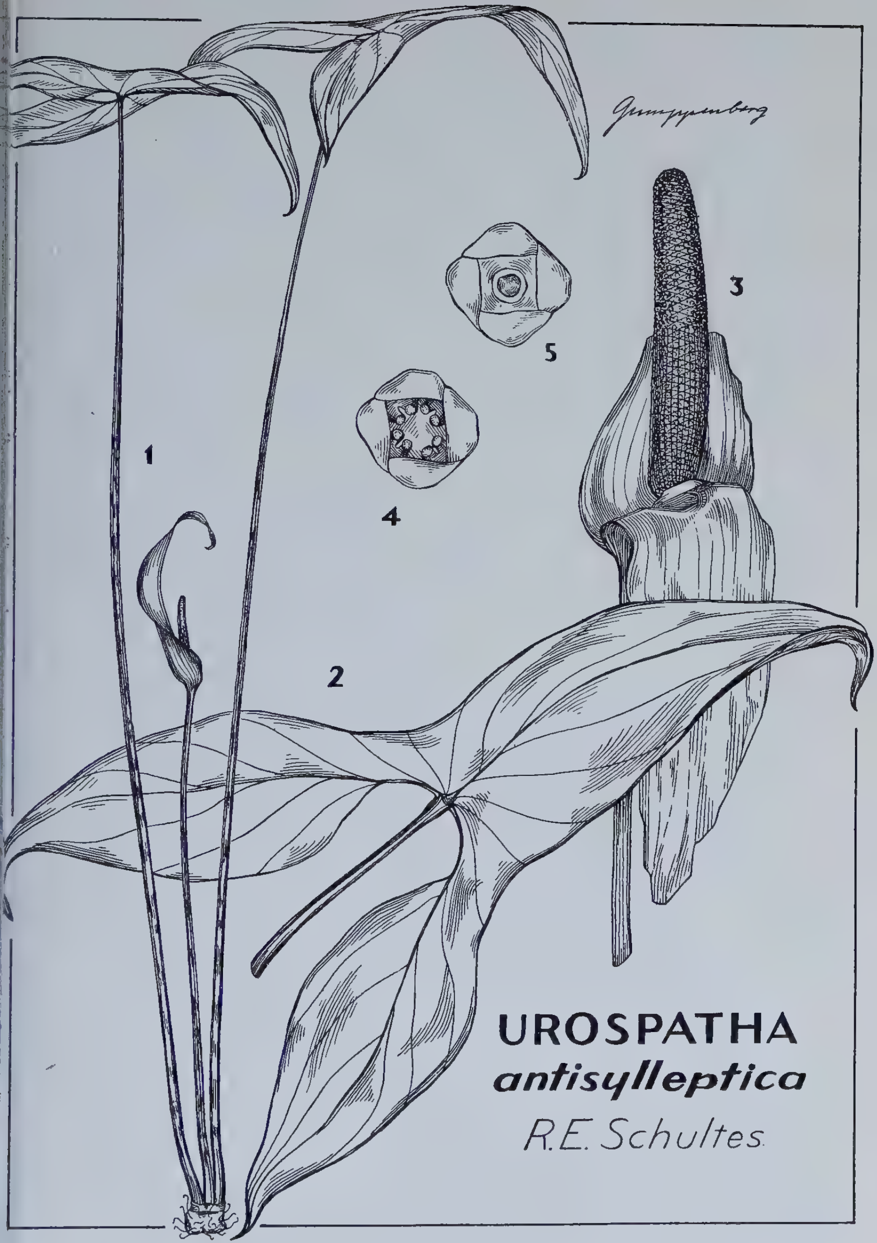
ANTHURIUM
polyschistum
Schultes et Idrobo

EXPLANATION OF THE ILLUSTRATION

Plate LXI. Urospatha antisylleptica *R. E. Schultes.* 1, habit drawing, approximately one fourteenth natural size. 2, mature leaf approximately one sixth natural size. 3, inflorescence with spathe partially removed to show sessile spadix, approximately three quarters natural size. 4 and 5, aspects of flower and ovary, approximately ten times natural size.

Drawn by John Gumppenberg

PLATE LXI



UROSPATHA
antisylleptica
R.E. Schultes

silia (non stipitatus), perfecte cylindricus, apice rotundatus, rufo-brunneus; spathae parte inferiore breviter adnatus, circiter 5.5 cm. longus, 1 cm. in diametro, a medio fertiles. Flores quattuor-tepali, virides. Ovarii obovoidei, loculi quattuor-ovulati. Baccae seminaque adhuc ignoti.

Urospatha antisylleptica differs from *U. decipiens* primarily in being much larger and in having the sinus between the median and lateral lobes of the leaf at least twice as long. From *Urospatha Hostmanii*, the new species may be distinguished by its larger size, by its verruculose (not glabrous) petioles and by its having the base of the spathe only very shortly adnate to the spadix.

The bright blood-red or scarlet callus at the base of the leaf blade or apex of the petiole in *Urospatha antisylleptica* may be a distinguishing feature from all other species, for I have seen no reference to such a color in the literature nor have I noticed it in several other species of this genus which I have had occasion to study and collect in the field.

Urospatha antisylleptica was pointed out independently by two Barasana Indians, who inhabit the upper course of the Río Piraparaná and its affluents, as the source of an oral contraceptive which is in common use in the tribe. They report that the unripened spadix is dried and pulverized and that, in order to prevent conception, the resulting brown powder is added to food given to any woman. My stay in the Río Piraparaná was not long enough to permit me to check these statements thoroughly or to see the plant used. Since the two sources of this information were independent of each other and since species of the *Araceae* are said to be similarly used in other parts of the Vaupés and elsewhere, I am inclined to give credence to the reports. The specific name *antisylleptica* (from the Greek meaning "against pregnancy") has been chosen to call attention to this unusual use of the plant.

Colombia: Comisaría del Vaupés, Río Piraparaná (tributary of Río Apaporis). Headwaters of Caño Teemeeña. "In water. Stem mottled black and grey-green. Spathe spiralled, outside purple-green, inside basally pink, above green-brown. Callus at base of leaf bright red. Height 6 feet." September 10, 1952, *Richard Evans Schultes & Isidoro Cabrera 17425* (Type in Herb. Gray).

Ochnaceae

Rhytidanthera regalis *R. E. Schultes* in Bot. Mus. Leafl. Harvard Univ. 16 (1953) 106, t. 18.

When this beautiful tree was described, a habit photograph was published. Inasmuch as it is well to illustrate as many novelties as possible with a drawing or a detailed photograph, the accompanying line-drawing of *Rhytidanthera regalis* is hereby offered.

Apocynaceae

Tabernaemontana rimulosa *Woodson ex R. E. Schultes* in Bot. Mus. Leafl. Harvard Univ. 18 (1958) 180; *sine specimine designatione.*

Through an editorial oversight, no type specimen was cited for the description of this concept. In the International Code of Botanical Nomenclature (1956), Article 35 stipulates that "publication on or after 1 Jan. 1958 of the name of a new taxon of recent plants of the rank of order or below is valid only when the nomenclatural type is indicated." In order to validate Woodson's publication, we hereby print the essensial data which was previously omitted. It is my understanding that this binomial, since it was not validly published, must date from the present article.

The type and only known collection of *Tabernaemontana rimulosa* is the following:

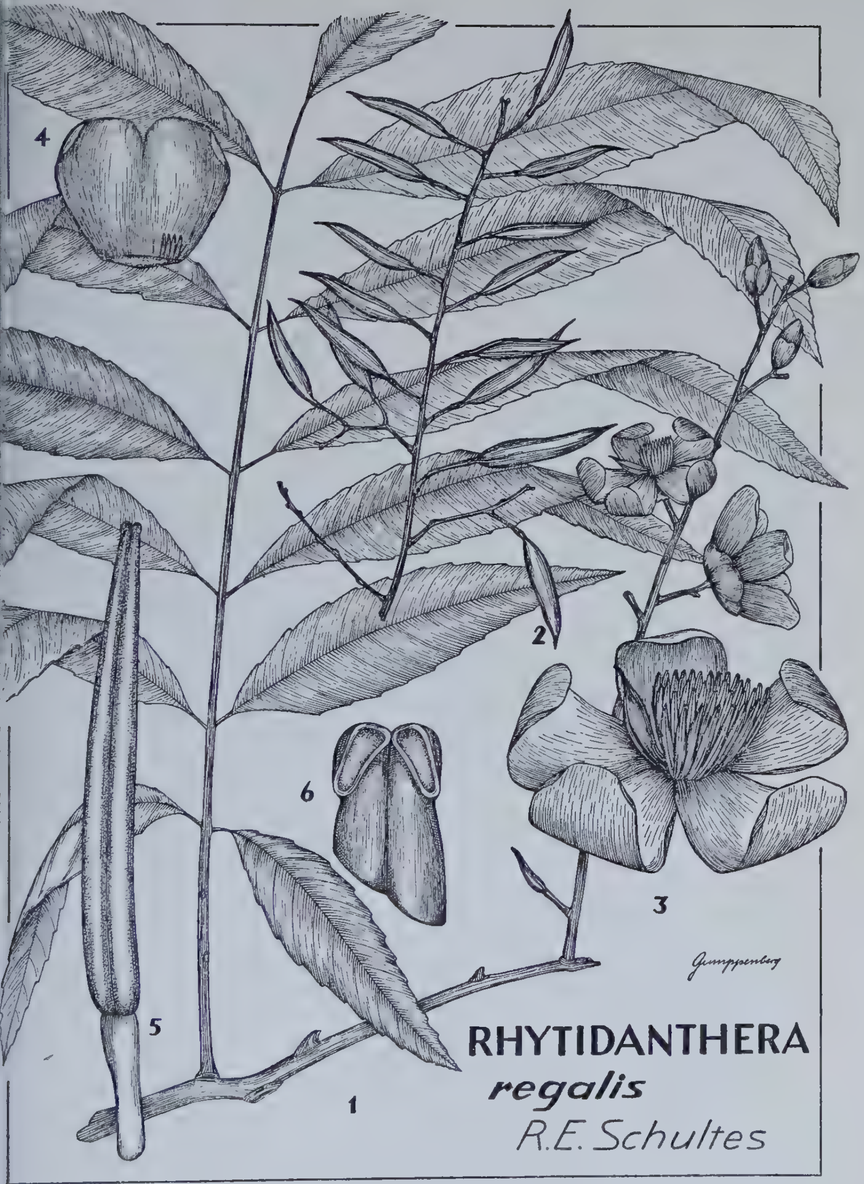
Colombia: Comisaría del Vaupés, Río Negro, San Felipe and vicinity (below confluence of Río Guainía and Río Casiquiare). Altitude about 600 feet. General location: Lat. 1°50′ N, Long. 67°0′ W. October 25, 1952. *Richard Evans Schultes, Richard E. D. Baker & Isidoro Cabrera 17983* (Type in Mo. Bot. Gard.).

EXPLANATION OF THE ILLUSTRATION

Plate LXII. Rhytidanthera regalis *R. E. Schultes.* 1, branch with leaves and flowers, approximately one half natural size. 2, fruits, approximately one half natural size. 3, flower, approximately one and one quarter natural size. 4, sepal, approximately one and one half natural size. 5, stamen, spproximately seven times natural size; apical part of stamen showing pores, approximately thirty times natural size.

Drawn by John Gumppenberg

PLATE LXII



RHYTIDANTHERA
regalis
R.E. Schultes

ON THE VALIDITY OF THE GENERIC NAME *COCHLEANTHES* RAF.

BY

Richard Evans Schultes and Leslie A. Garay

The orchid genus which is known as *Warscewiczella* Rchb.f. appears to be worthy of recognition, but the validity of this name is open to serious doubt. We consider that the genus is closely related to *Chondrorhyncha* of the *Huntleyinae*, but many of the species which properly belong to *Warscewiczella* have been referred to various genera of the *Zygopetalinae*. The entire *Huntleya-Zygopetalum* alliance is in need of a critical study. It is, however, essential to clarify some of the nomenclatorial problems prior to the undertaking of such a study, and a start in this direction has been made in the present paper.

Reichenbach established the genus *Warscewiczella* in 1852, basing his concept on *Warrea discolor* Lindl., and pointing out its relationship to *Warrea* and *Chondrorhyncha*. In 1836, Lindley had described, as *Zygopetalum cochleare*, a plant from Trinidad which cannot be accommodated in *Zygopetalum* as now interpreted, but which conforms with Reichenbach's *Warscewiczella*. In the same year, Rafinesque indicated that Lindley's *Zygopetalum cochleare* represented a distinct genus which he called, quite appropriately, *Cochleanthes*, citing as type "*Zygopetalum cochleare* Lindl. b. reg. 1857" and stating that it was "quite a different G. from *Z. makai* H. b. m.

2748." Rafinesque proposed for Lindley's *Zygopetalum cochleare* a new specific name under *Cochleanthes* — *C. fragrans* — instead of making the correct transfer.

There is every reason to accept *Cochleanthes* as the proper name for this generic concept, even though it has been almost completely neglected[1] in orchidological literature. Under the International Code of Botanical Nomenclature, the only way to avoid a change to *Cochleanthes* would be to conserve *Warscewiczella.* This procedure we are not willing to propose, since the genus is a small one and since none of the species involved has ever assumed important stature in horticulture.

Cochleanthes *Rafinesque* Fl. Tellur. 4 (1836) 45.

Warscewiczella Rchb. f. in Bot. Zeit. 10 (1852) 635.

Zygopetalum sect. *Cochleare* Rchb. f. in Walp. Ann. Bot. Syst. 6 (1863) 652.

Zygopetalum sect. *Warscewiczella* Rchb. f. ibid. 6 (1863) 653.

ORIGINAL DESCRIPTION:

930. **Cochleanthes** *R.* (shell fl.) petalis connivens ovat. undul. lab. cochleato bilobo, basi crista cochleata (ut plecton plicata) calcar col. clavata, anth. 2loc., 2labiata, pollinia 4eq. *caulescens, fl. axillaris.*—Type *C. fragrans* R. fol. lanceol. 5nervis, pedic. 1fl. axillaris. Trinidad. fl. ample fragrant white, lip purple. It is Zygopetalum cochleare Lindl. b. reg. 1857, but quite a different G. from Z. makai H. b. m. 2748, with petals secund, lip flabellate with a spur, anther calciform, 4 uneq. pollen."

Cochleanthes amazonica (*Rchb.f. & Warsc.*) *R.E. Schultes & Garay comb. nov.*

Warscewiczella amazonica Rchb. f. & Warsc. in Bonpl. 2 (1854) 97.

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[1] Hoehne (in Hoehne, Fl. Brasilica 12: pt. 7 (1953) 171), in referring to "*Cochleanthus* Rafin.", has pointed out that this is the prior name, but, for reasons not explained, he continued to employ *Warscewiczella.*

Zygopetalum amazonicum (Rchb.f. & Warsc.) Rchb.f. in Walp. Ann. Bot. Syst. 6 (1863) 655.

Warscewiczella Lindeni Hort. in Journ. Hort. 1 (1892) 449.

Zygopetalum Lindeni (Hort.) Rolfe in Lindenia 8 (1892) 5, t. 337.

Cochleanthes aromatica (*Rchb.f.*) *R. E. Schultes & Garay comb. nov.*

Zygopetalum aromaticum Rchb.f. in Bot. Zeit. 10 (1852) 668.

Warscewiczella aromatica (Rchb.f.) Rchb.f. in Walp. Ann. Bot. Syst. 6 (1863) 654.

Zygopetalum Wendlandi Rchb.f. in Beitr. Orch. Centr.-Amer. (1866) 74.

Bollea Wendlandiana Hort. ex Gard. & For. 1 (1888) 315.

Warscewiczella Wendlandi (Rchb.f.) Schltr. in Beih. Bot. Centralbl. 36, pt. 2 (1918) 494.

Chondrorhyncha aromatica (Rchb.f.) P. H. Allen in Ann. Missouri Bot. Gard. 36 (1949) 85.

Cochleanthes bidentata (*Rchb.f. ex Hemsl.*) *R.E. Schultes & Gary comb. nov.*

Zygopetalum bidentatum Rchb.f. ex Hemsl. in Salvin Biol. Centr. Amer. 3 (1885) 251.

Warscewiczella bidentata (Rchb.f. ex Hemsl.) Schltr. in Beih. Bot. Centralbl. 36, pt. 2 (1918) 494.

Cochleanthes candida (*Lindl.*) *R. E. Schultes & Garay comb. nov.*

Warrea candida Lindl. in Paxt. Fl. Gard. 1 (1851) 32, fig. 22.

Huntleya candida Hort. ex Lindl. loc. cit., *in synon.*

Zygopetalum candidum (Lindl.) Rchb.f. in Walp. Ann. Bot. Syst. 6 (1863) 656.

Cochleanthes digitata (*Lehm.*) *R. E. Schultes & Garay comb. nov.*

Warrea digitata Lemaire in Illustr. Horticol. 3 (1856) Misc. p. 70.

Huntleya imbricata Pinel. ex Lem. in Illustr. Horticol. 4 (1857) sub t. 152, *in synon.*

Warscewiczella digitata Barb.-Rodr. Struct. des Orchid. (1883) t. 13, fig. 3.

Cochleanthes discolor (*Lindl.*) *R. E. Schultes & Garay comb. nov.*

Warrea discolor Lindl. in Journ. Hort. Soc. Lond. 4 (1849) 265.

Warscewiczella discolor (Lindl.) Rchb. f. in Bot. Zeit. 10 (1832) 636.

Zygopetalum discolor (Lindl.) Rchb. f. in Walp. Ann. Bot. Syst. 6 (1863) 655.

Chondrorhyncha discolor (Lindl.) P. H. Allen in Ann. Missouri Bot. Gard. 36 (1949) 87.

Cochleanthes flabelliformis (*Sw.*) *R. E. Schultes & Garay comb. nov.*

Epidendrum flabelliforme Sw. Prodr. (1788) 123.

Cymbidium flabelliforme (Sw.) Sw. in Nov. Act. Ups. 6 (1799) 73.

Cochleanthes fragrans Raf. Fl. Tellur. 4 (1836) 45.

Zygopetalum cochleare Lindl. in Bot. Reg. 22 (1836) t. 1857.

Eulophia cochleata Knight ex Hooker in Bot. Mag. 64 (1837) sub t. 3585, *in synon.*

Zygopetalum cochleatum Paxton Magaz. Bot. 4 (1838) 279.

Eulophia cochlearis (Lindl.) Steudel Nom., ed. 2, 1 (1840) 605.

Warscewiczella cochlearis (Lindl.) Rchb. f. in Bot. Zeit. 10 (1852) 714.

Huntleya imbricata Hort. ex Rchb.f. ibid., *in synon.*
Zygopetalum flabelliforme (Sw.) Rchb.f. in Walp. Ann. Bot. Syst. 6 (1863) 652.
Zygopetalum conchaceum Hoffmansegg ex Rchb.f. ibid., *in synon.*
Cymbidium flabellifolium Sw. ex Griseb. Fl. Brit. West Ind. Isl. (1864) 629, *in synon.*
Warscewiczella cochleata Barb. Rod. Struct. des Orchid. (1883) t. 13, fig. 4.
Zygopetalum Gibeziae N. E. Brown in Lindenia 4 (1888) 79, t. 181.
Warscewiczella Gibeziae (N. E. Brown) Stein Orchideenb. (1892) 595.
Warscewiczella flabelliformis (Sw.) Cogn. in Urban Symb. Antill. 4 (1903) 182.

Cochleanthes heteroclita (*Poepp. & Endl.*) *R.E. Schultes & Garay comb. nov.*
Maxillaria heteroclita Poepp. & Endl. Nov. Gen. ac Sp. 1 (1836) 37, t. 63.
Zygopetalum rhombilabium C. Schweinf. in Amer. Orch. Soc. Bull. 12 (1944) 422.
Warscewiczella heteroclita (Poepp. & Endl.) Hoehne in Arq. Bot. Est. S. Paulo, nov. ser., 2, pt. 6 (1952) 126.

Cochleanthes ionoleuca (*Rchb.f.*) *R. E. Schultes & Garay comb. nov.*
Zygopetalum ionoleucum Rchb.f. in Bot. Zeit. 23 (1865) 99.
Warscewiczella ionoleuca (Rchb.f.) Schltr. in Fedde Rep. Beih. 7 (1920) 267.

Cochleanthes Klugii (*C. Schweinf.*) *R. E. Schultes & Garay comb. nov.*

Zygopetalum Klugii C. Schweinf. in Bot. Mus. Leafl. Harvard Univ. 15 (1952) 150.

Cochleanthes Lueddemanniana (*Rchb.f.*) *R. E. Schultes & Garay comb. nov.*

Warscewiczella Lueddemanniana Rchb.f. in Hamb. Gartenzeit. 16 (1860) 179.

Zygopetalum Lueddemannianum (Rchb.f.) Rchb.f. in Walp. Ann. Bot. Syst. 6 (1863) 653.

Cochleanthes marginata (*Rchb.f.*) *R. E. Schultes & Garay comb. nov.*

Warscewiczella marginata Rchb.f. in Bot. Zeit. 10 (1852) 636.

Huntleya marginata Hort. ex Rchb.f., loc. cit.

Warrea marginata Rchb.f., loc. cit.

Warrea quadrata Lindl. in Gard. Chron. (1853) 647.

Warscewiczella velata Rchb.f. in Bot. Zeit. 23 (1865) 99.

Zygopetalum quadratum Pfitz. Vergl. Morph. Orch. (1881) 58.

Chondrorhyncha Lipsicombiae Rolfe Kew Bull. (1912) 133.

Chondrorhyncha marginata (Rchb.f.) P. H. Allen in Ann. Missouri Bot. Gard. 36 (1949) 88.

Cochleanthes trinitatis (*Ames*) *R. E. Schultes & Garay comb. nov.*

Zygopetalum trinitatis Ames Sched. Orchid. 3 (1923) 21.

Cochleanthes Wailesiana (*Lindl.*) *R. E. Schultes & Garay comb. nov.*

Warrea Wailesiana Lindl. in Journ. Hort. Soc. 4 (1849) 264.

Zygopetalum Wailesianum (Lindl.) Rchb.f. in Walp. Ann. Bot. Syst. 6 (1863) 656.
Warscewiczella Wailesiana (Lindl.) Rchb.f. ex Morren in Belg. Hort. 28 (1878) 183.

EXCLUDED SPECIES

Warscewiczella calloglossa *Schltr.* in Fedde Rep. 12 (1913) 216 = *Chondrorhyncha calloglossa* (Schltr.) P. H. Allen.

Warscewiczella Gehrtiana *Hoehne* in Arq. Bot. Est. S. Paulo, nov. ser., 1, pt. 1 (1945) 5 = *Hoehneella Gehrtiana* (Hoehne) Ruschi.

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